IRON & COAL

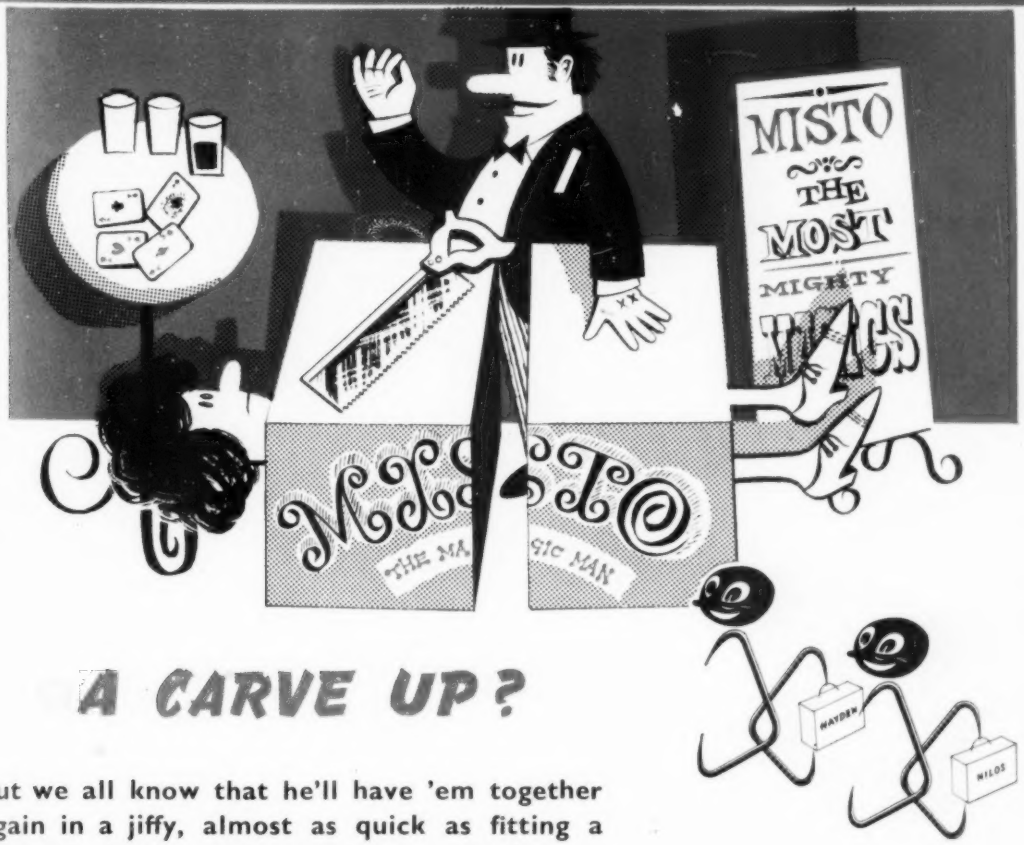
THE IRON AND COAL TRADES' REVIEW

VOL. 182 — No. 4,828

Offices: John Adam House, 17/19, John Adam Street, London, W.C.2

LONDON: FRIDAY, JANUARY 13, 1961

Registered as a Newspaper. Single copies 1s. By post 1/4. Ann. Subs.: 52s. (Abroad 65s.)



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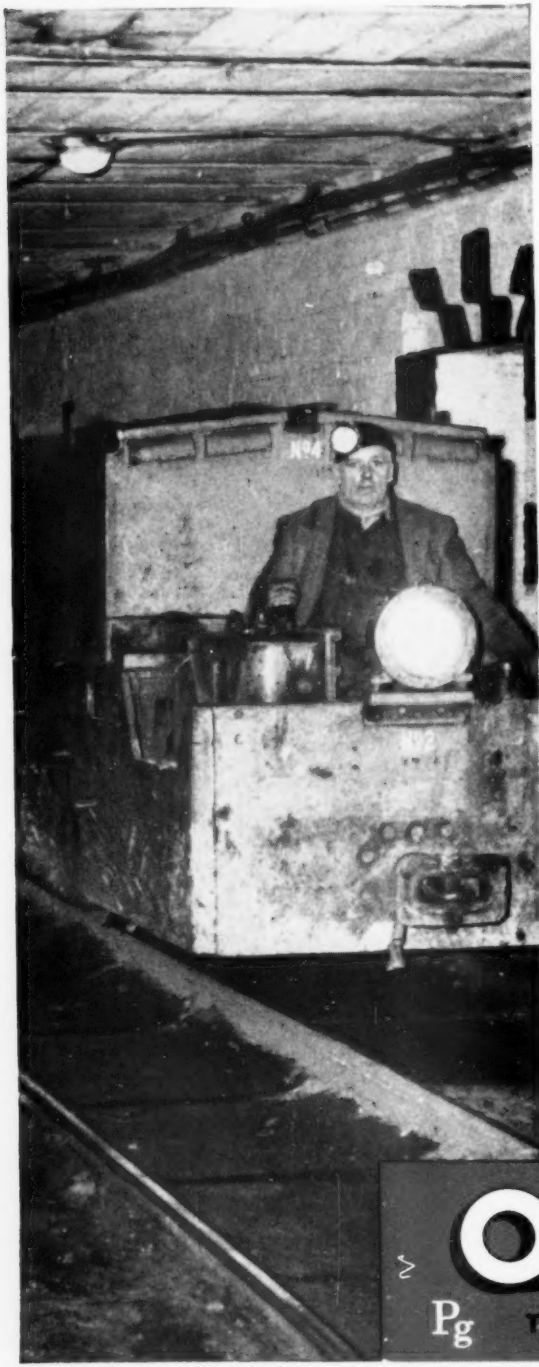

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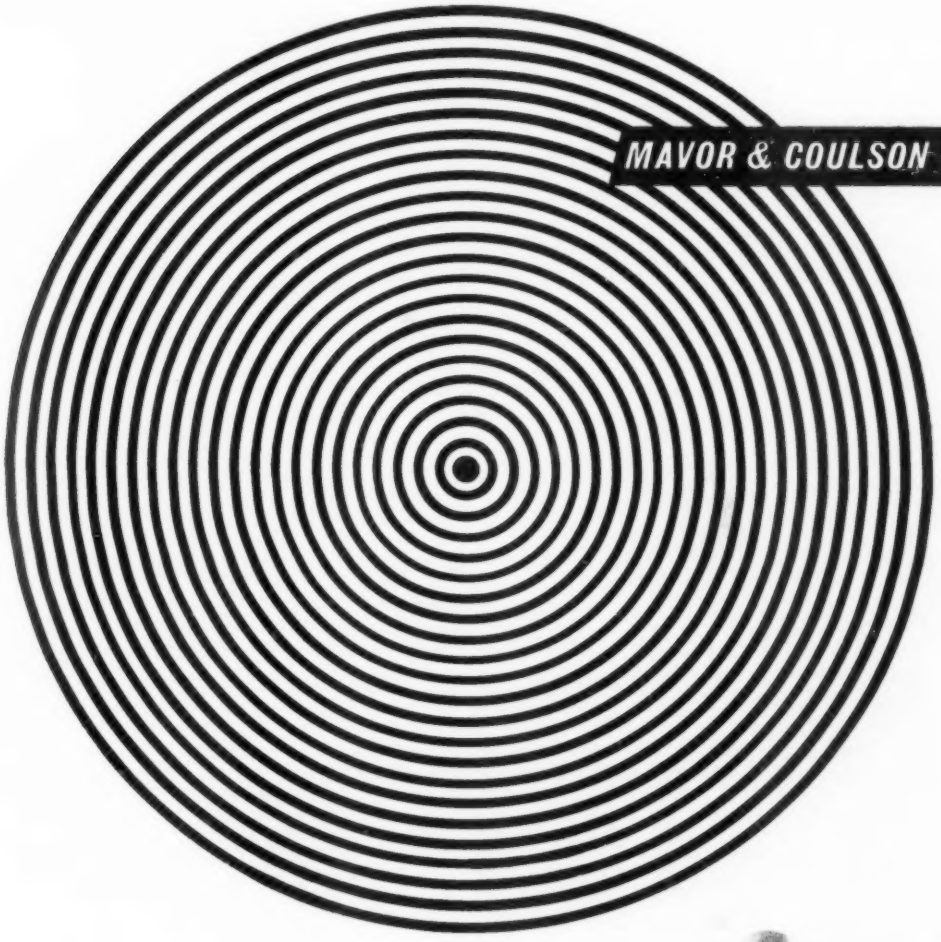
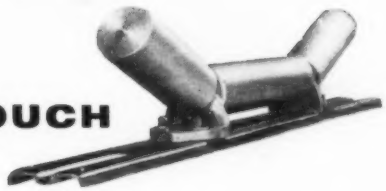


M&C IDLERS SPIN AT A TOUCH



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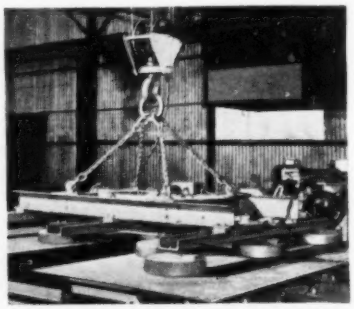
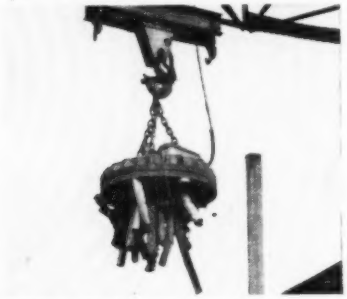
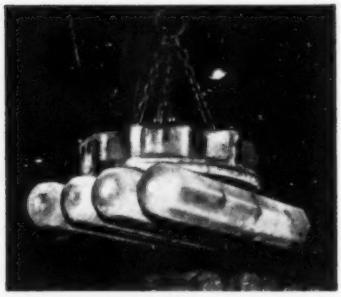


A group of lifting magnets at the Manor Works of Joseph Sankey & Sons handling plates for the magnet yoke of a 7000 MeV proton-synchrotron.



Lifting pig iron at Round Oak Steelworks Ltd.



Lifting four ingots at the works of Taylor Brothers & Co. Ltd., Trafford Park. The total lift is about 13,440 lbs.

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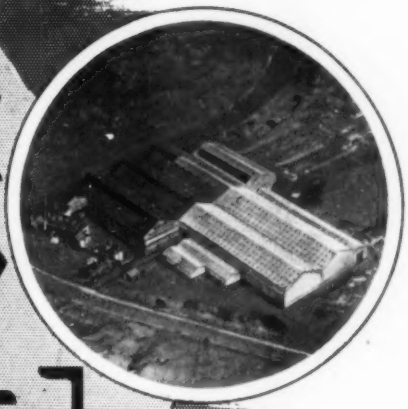

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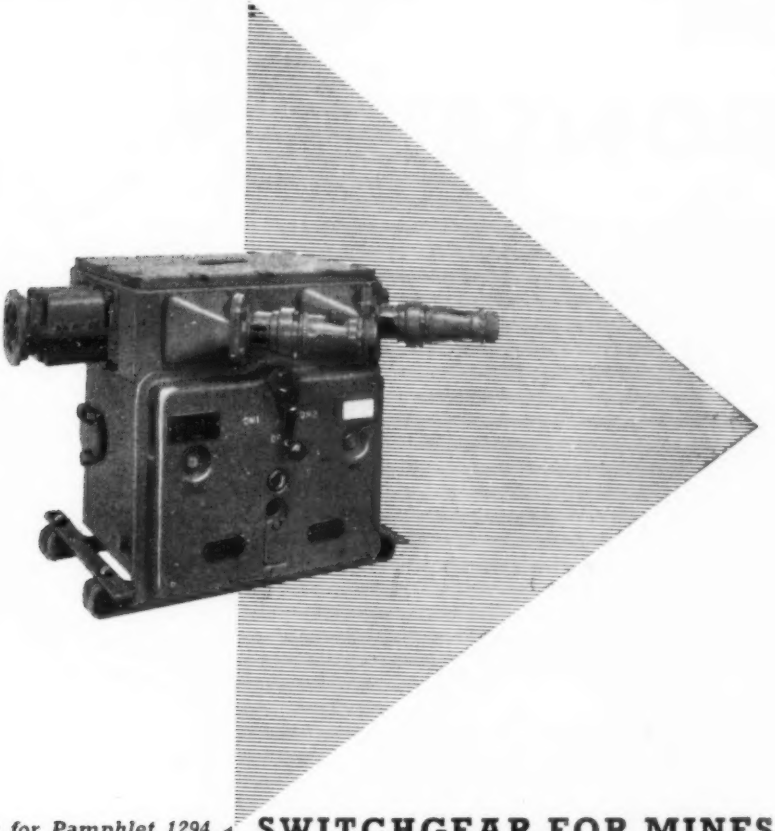

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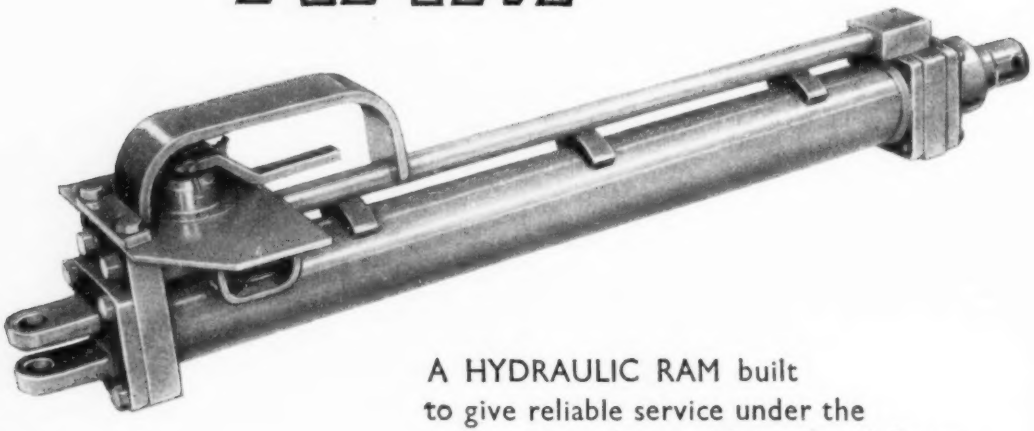

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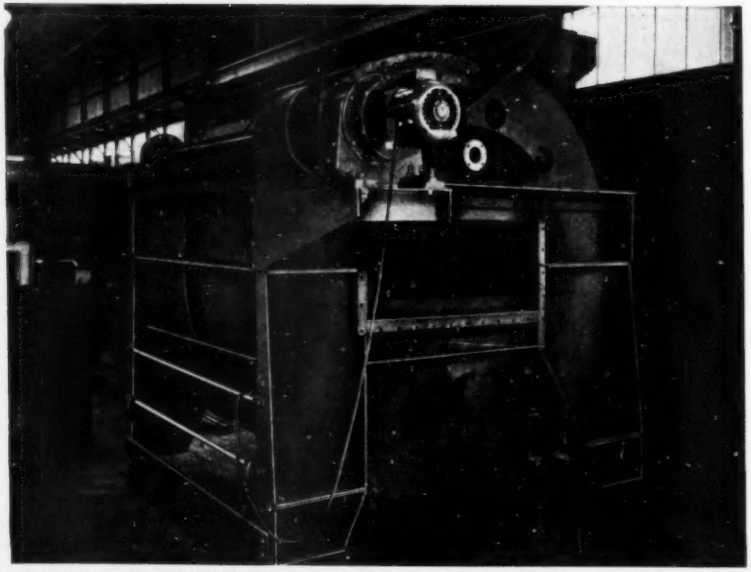

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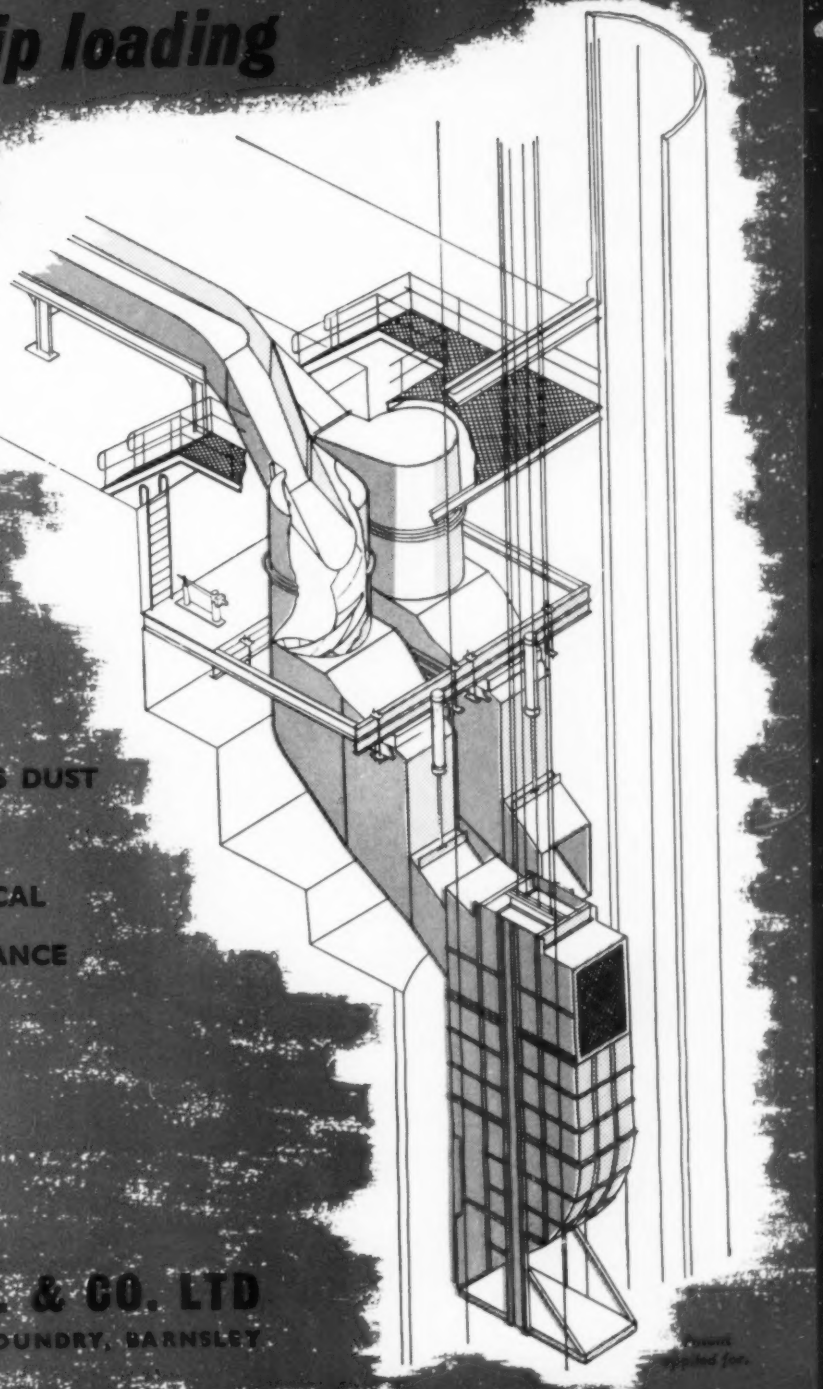

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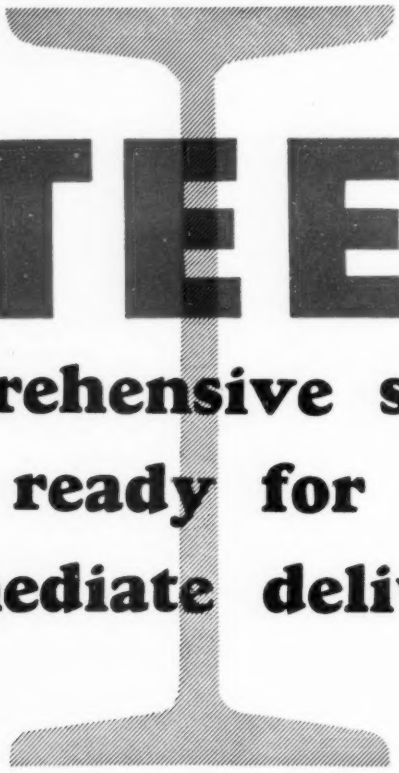

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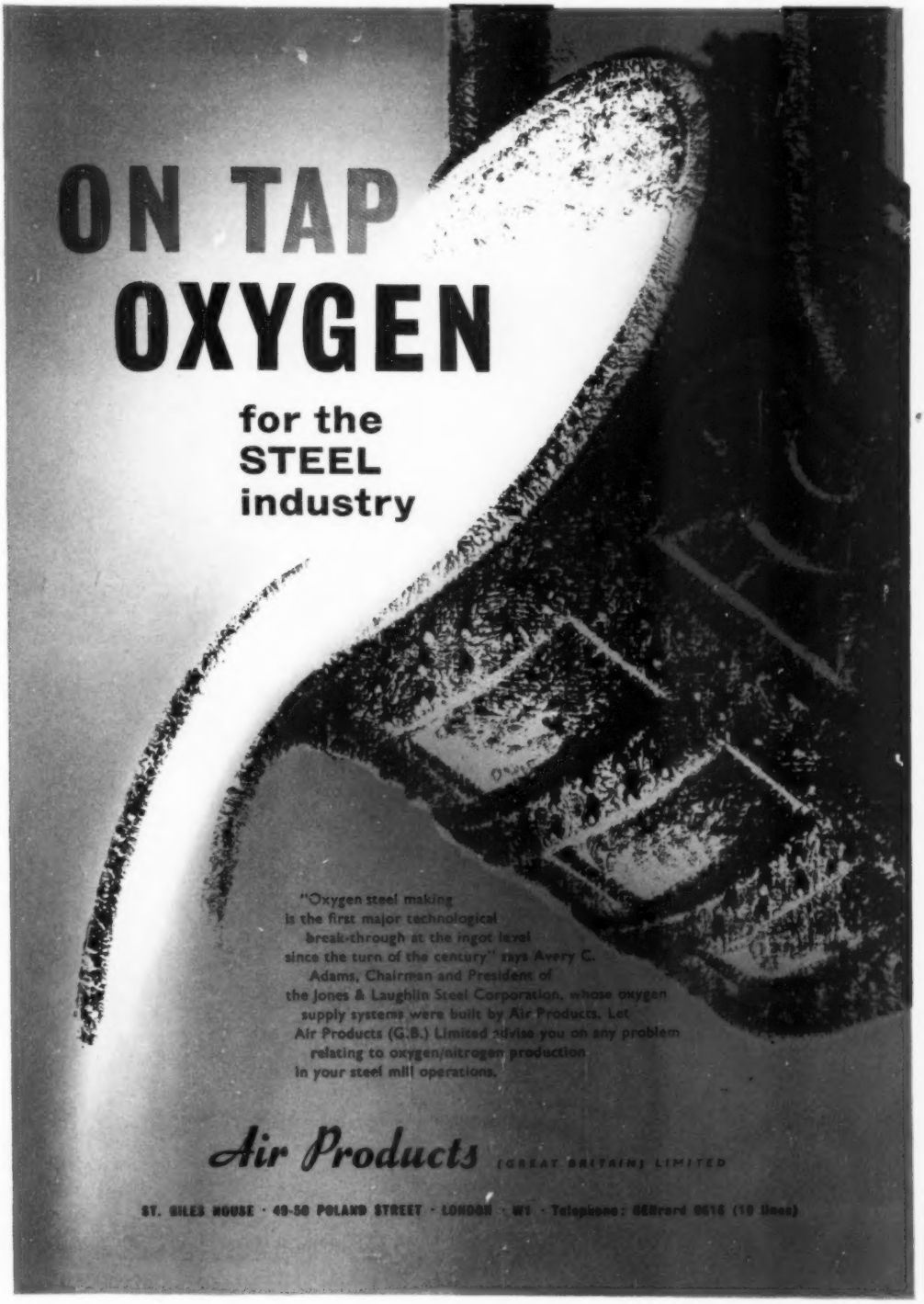
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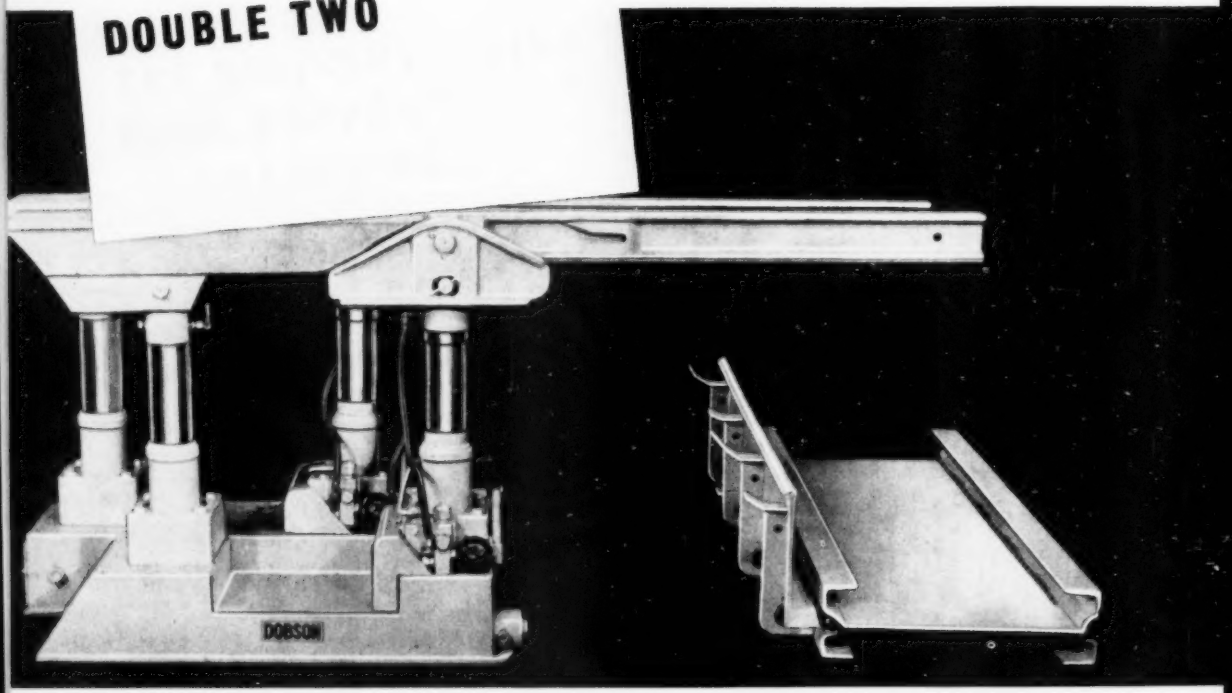

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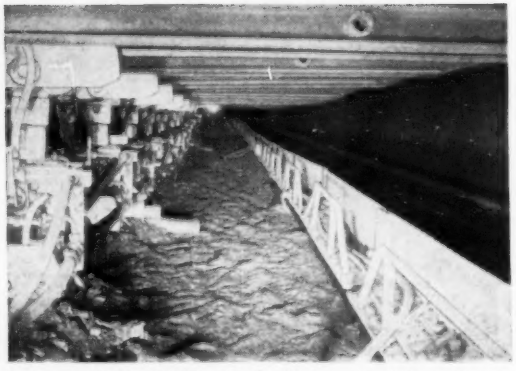
- ★ High initial resistance of the Supports to near yield load from low line pressure (1000-lb p.s.i. of water and soluble oil) by means of intensifier units in each Master and Slave Section.



Dobson Double Two Self Advancing Roof Supports installed on a Shearer Face in a 3-foot seam.

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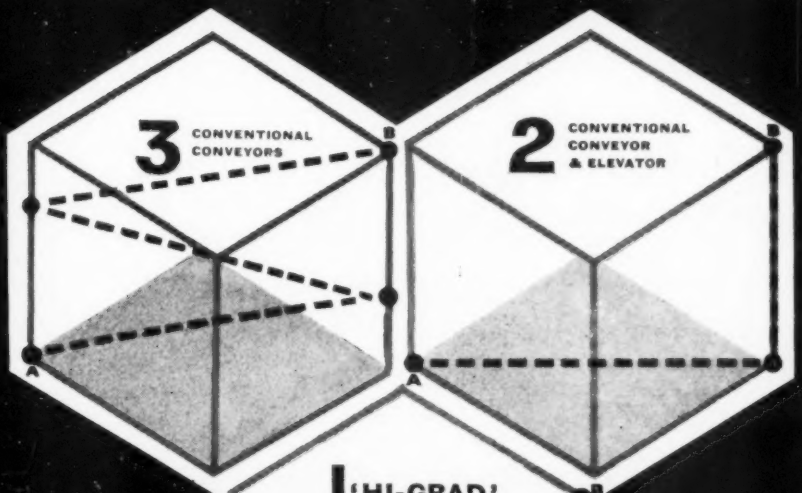
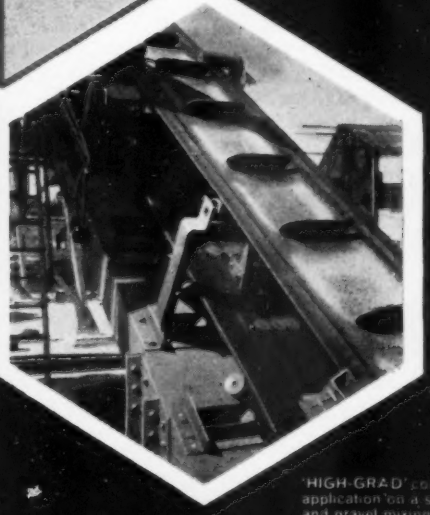


Here's the 'HI-GRAD'

it takes the short cut to cutting conveyor costs

When large or small tonnages of granular material require conveying and elevating from point A to point B, the most economical route is the direct one. In the past, three conventional conveyors at 20° were utilised with a possible roll back of material, or one conventional conveyor and an elevator was used. Both these schemes are costly on space, time, and money.

The 'HI-GRAD' can convey the materials direct from A to B in a restricted space at less capital cost, less maintenance and running cost, and the material is protected from wind and weather.



'HIGH-GRAD' conveyor application on a sand and gravel mixing plant

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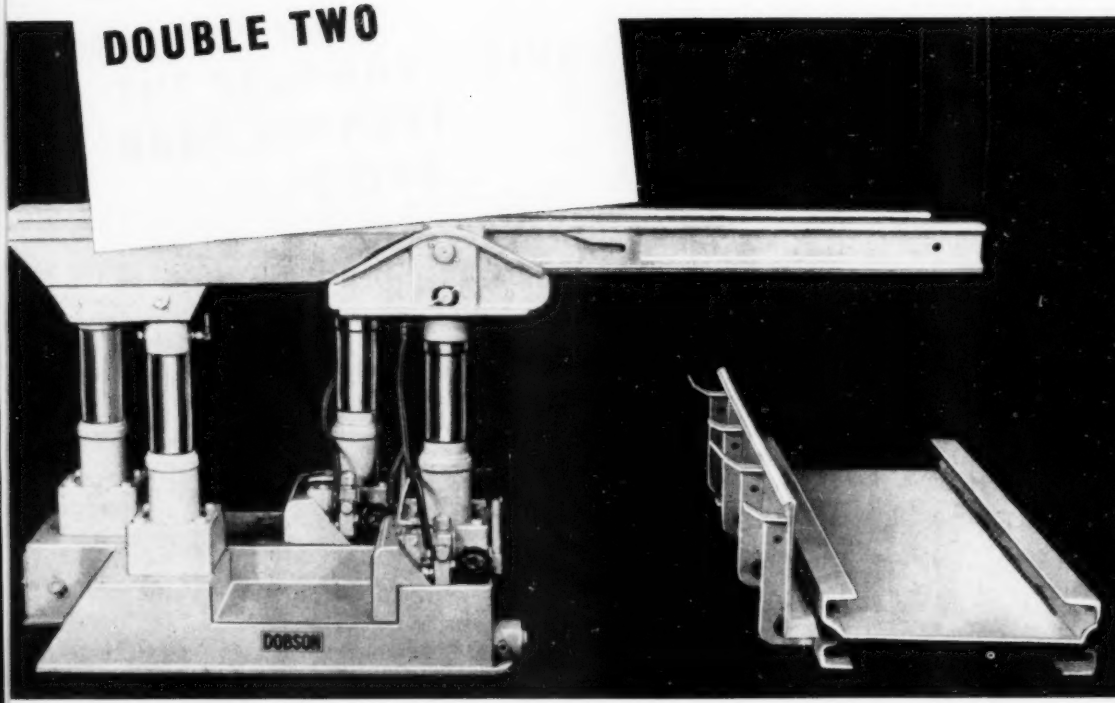

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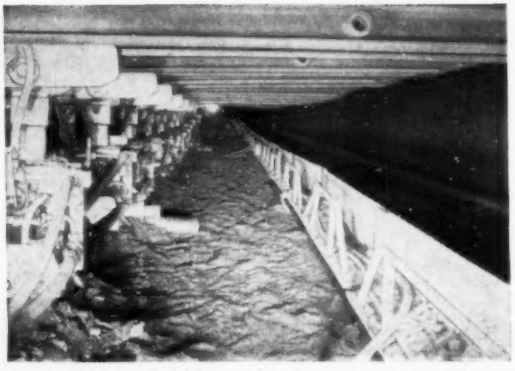

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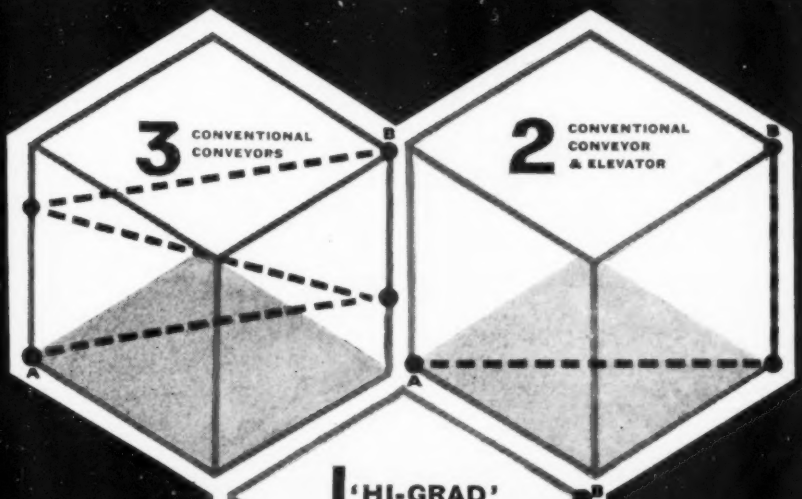

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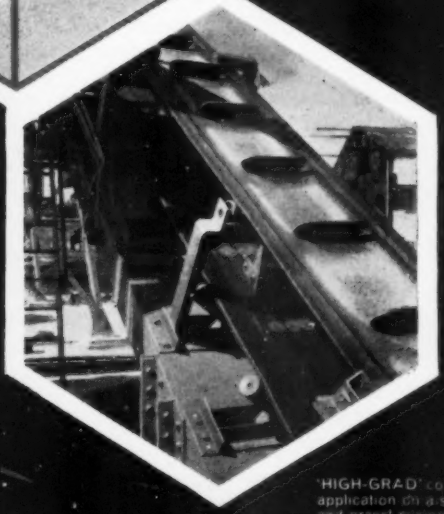

'HIGH-GRAD' conveyor application on a sand and gravel mixing plant

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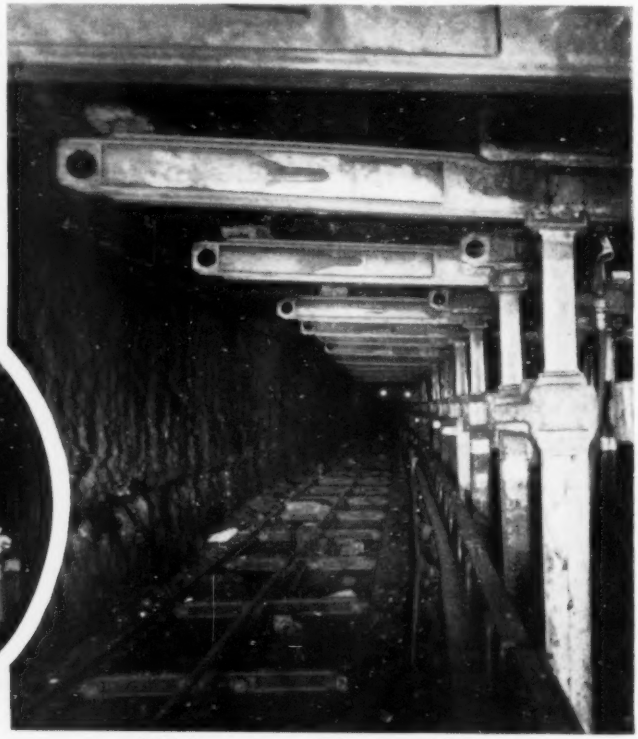
TORSION PROPS

Application of Hydraulic Clamping Device



GHH Torsion Props (NCB approval M 20) and GHH TZG 120 Bars (NCB approval B3)

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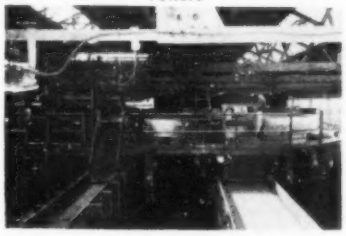
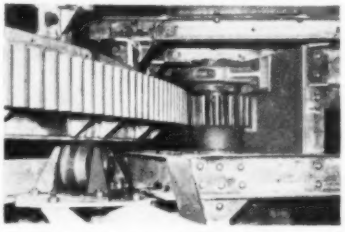


Separate belts convey the graded coal



The driving gear is built up from 16 identical cast steel segments.

For the production of large coal, the Rotary Sorting Table has the following advantages over the old picking belts:-

(a) Reduction of degradation by eliminating cross belts and complicated transfer points.

(b) Considerable saving in manpower.

(c) Sorting is simplified by the use of rakes (see photograph above).

(d) Ease of supervision. The operators form a compact group on the inside and round the periphery of the table.

The improved drive (patent applied for) incorporated in the Rigley Table has reduced maintenance to an absolute minimum. One of our tables has been in continuous operation for over three years and handled over two million tons of coal without breakdown or major renewal.

Our Engineers will be pleased to advise on the size and type of table to meet your requirements.

WILLIAM RIGLEY & SONS LTD.,
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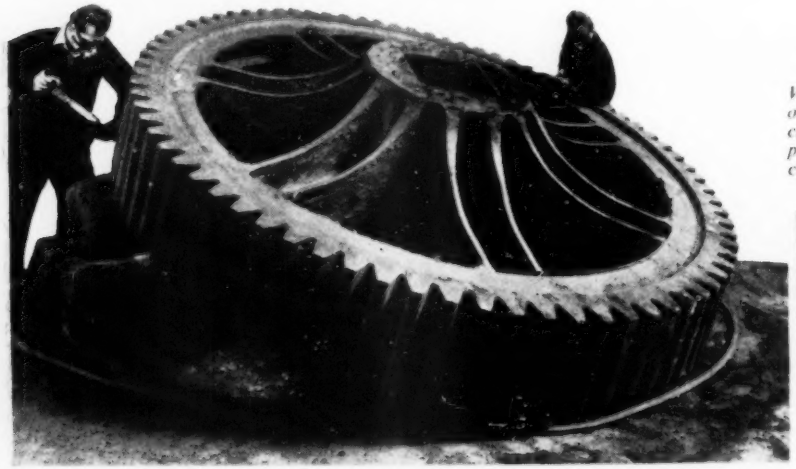
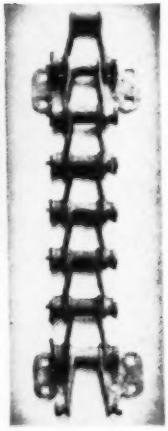
Our steel foundry, one of the largest and most up-to-date in the country, provides a range of castings varying in size from a few ounces up to a finished weight of about 14 tons.

With three different methods of steel melting available—Tropenas converter, electric arc and high frequency—we can make steel castings to cover the entire range of required compositions, from carbon steels to alloy steels including manganese, stainless and heat-resisting steels. Well-equipped pattern, heat-treatment and machine shops for finish machining, enable us to give a *complete service in Steel Castings for the requirements of every industrial user.*

Main walking gear for large walking dragline excavator, two required per set.
Weight 11 *tons* 3 *cwt. each.*



Weighing a few ounces each, steel castings of links and pins for a conveyor chain.



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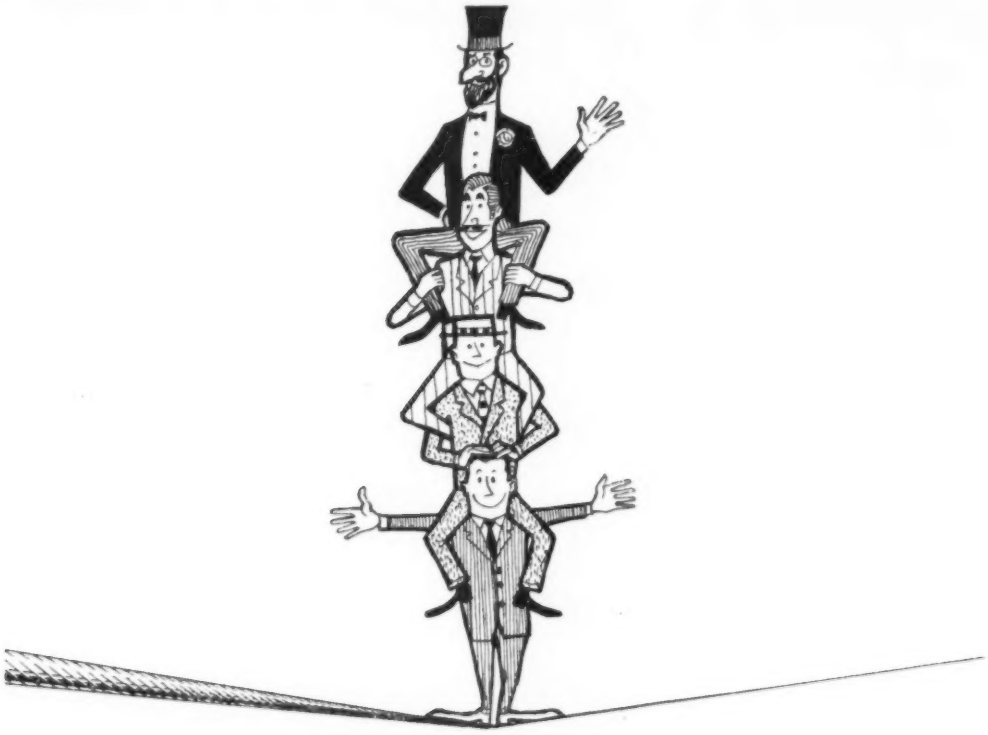

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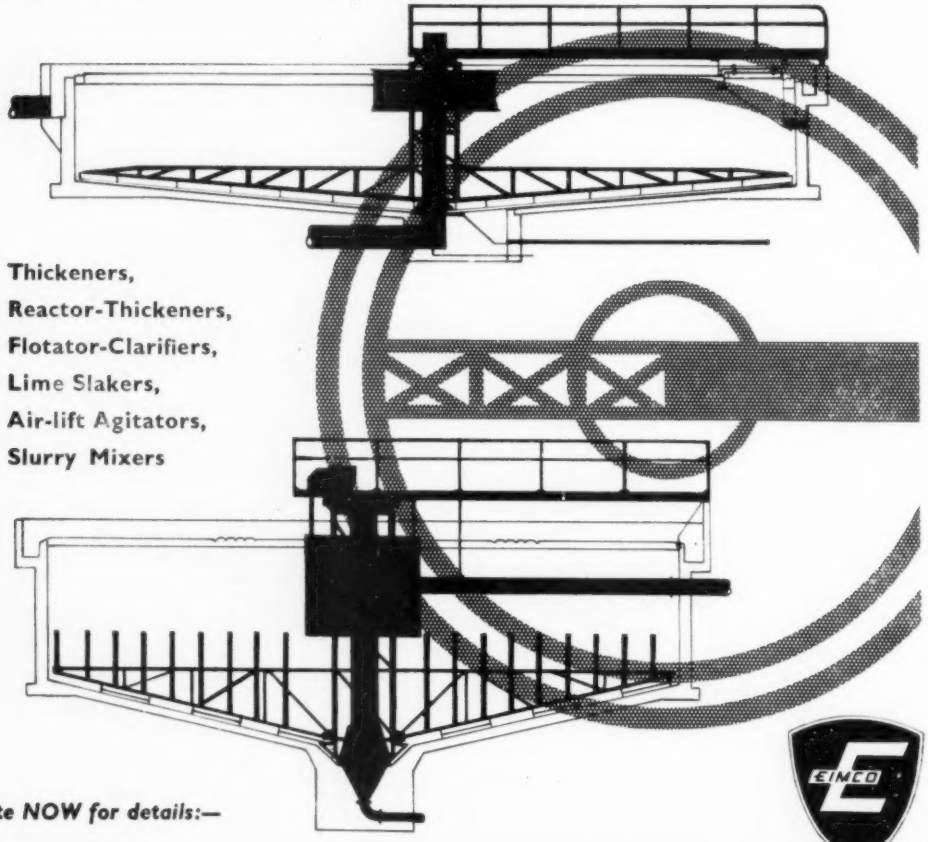

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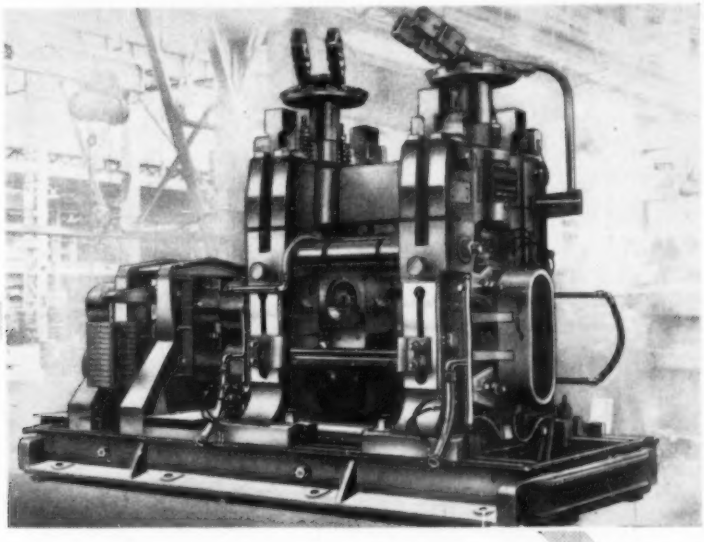

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This mill and the roller tables were supplied for the DURGAPUR IRON & STEEL WORKS by—

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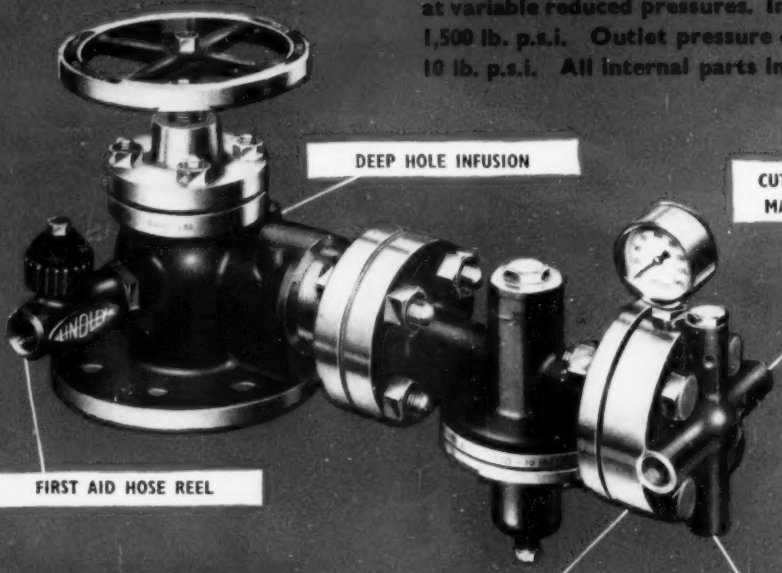
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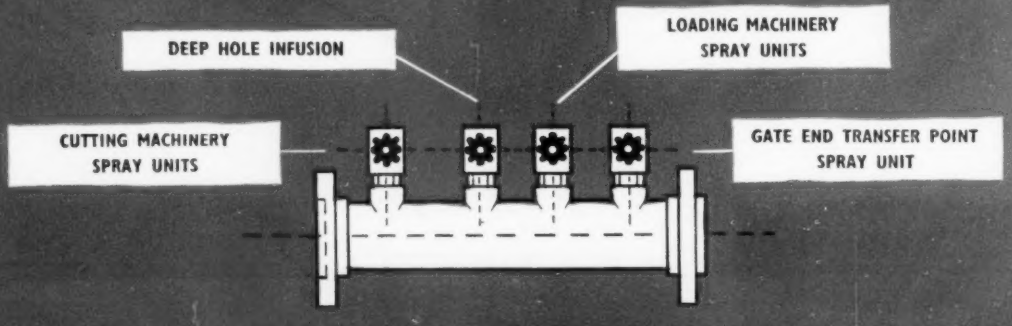

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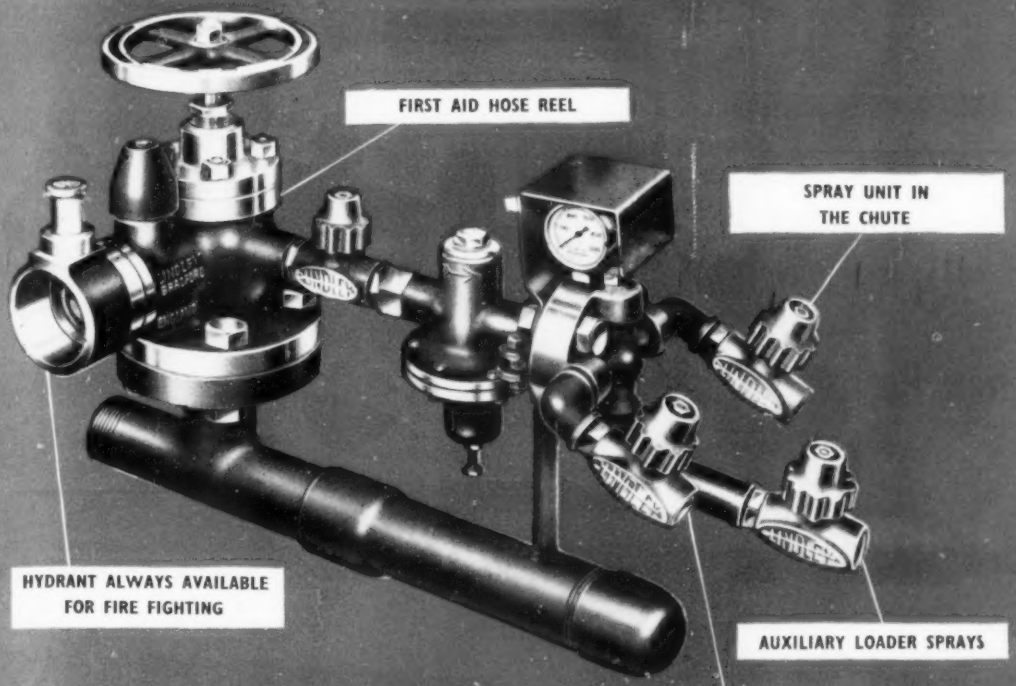
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Allied with the new Tigerschiold method of hot-top manufacture, the CO_2 silicate process enables you to cut your costs dramatically. The Tigerschiold method—easy to apply, and giving speedier production, greater ingot yield, and longer mould life—uses the CO_2 silicate process exclusively. The British patent rights to the CO_2 silicate process are held by I.C.I., and I.C.I. technical service—already well known in the foundry trade—is freely available to customers.

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British licensee of the Tigerschiold method (Brit. Pat. No. 778,039) is Hinckley's Ltd., Sheffield 7. The CO_2/silicate process is protected by Brit. Pat. No. 654,817

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'Drikold' and the 'Drikold' Liquefier — for the small user. I.C.I. Liquid Carbon Dioxide in Bulk and the 5-ton capacity storage tank—for the large user.

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New Hot-top method reduces steel-making costs!

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8 coking plants put to work during 1960

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An entirely new concept in mechanical handling

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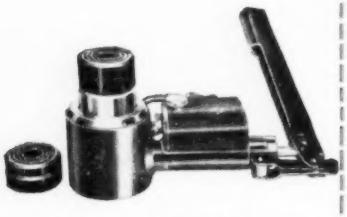

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Large capacity for use in confined spaces. Light enough for ONE MAN to use. Swaying under load eliminated by large diameter cylinder providing easy adjustment of height. Capacities from 10 to 30 tons.

BABY 60 ELECTRIC HOIST BLOCKS

BRITISH MADE

Patents Pending. 5 and 10 cwt. capacity. Light weight, compact and portable. Pushbutton control. Upper and lower overtravel limit switches. Supplied for any height of lift to suit requirements. Top hook suspension facilitates attachment to travelling trolleys or girder clamps, etc.

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Entirely new design giving TWO SLINGS IN ONE. Sling legs lock automatically when lifting starts. Saves labour, time and accidents. Capacities from 1 ton to 20 tons.

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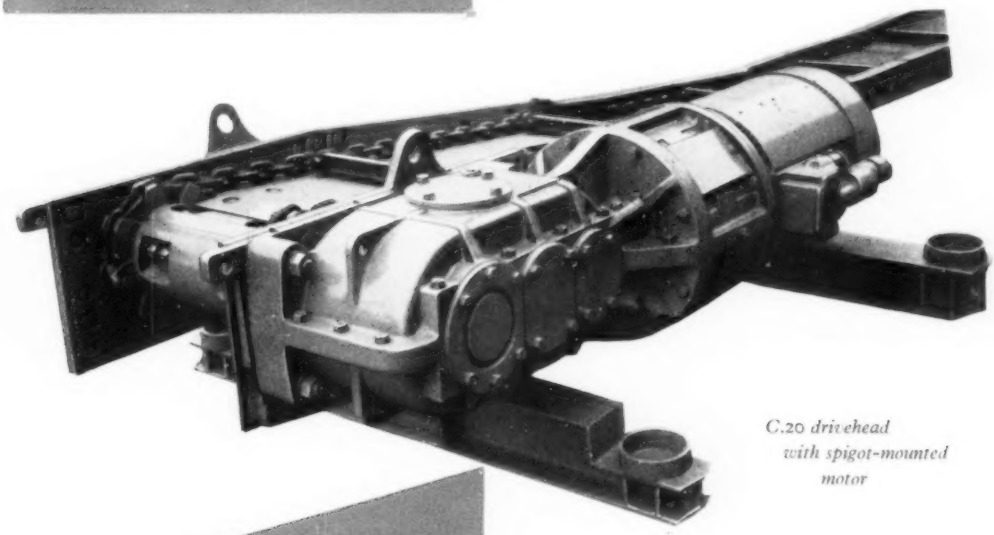
F2

C20 armoured conveyors



C.20 drivehead with spigot-mounted motor

* 60 *h.p. continuously-rated motors also available*

The C.20 conveyor is made in nominal widths of 24", 30" and 36" and can have up to four 50 h.p. power units. These B.J-D motors are fully F.L.P. and have the reliability for which all B.J-D electric motors are known.
Sections and chains are to N.C.B. specifications.

BJD
CONVEYORS

BRITISH JEFFREY-DIAMOND LTD., WAKEFIELD, YORKS. LONDON, 15-17 CAXTON ST., S.W.1.

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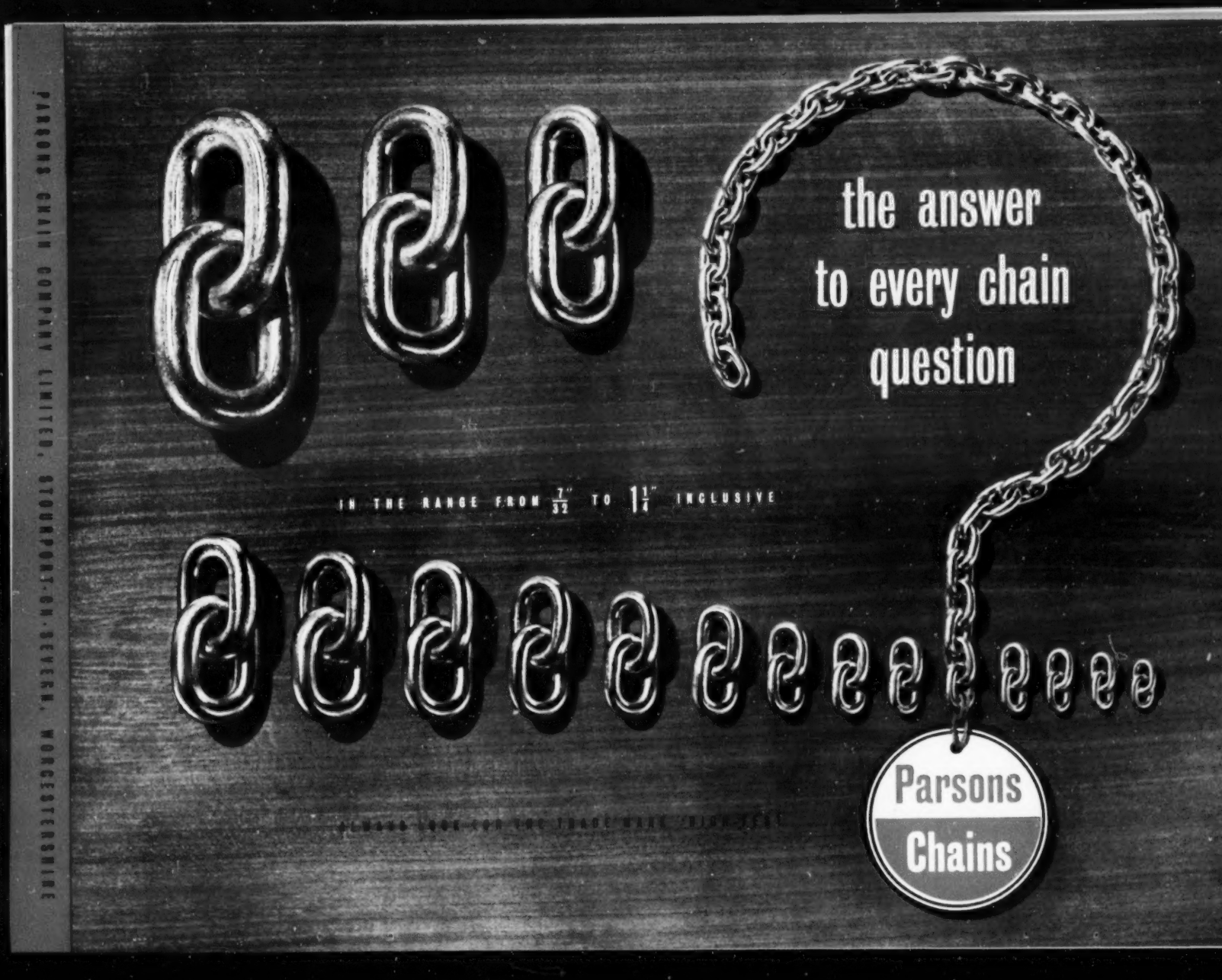
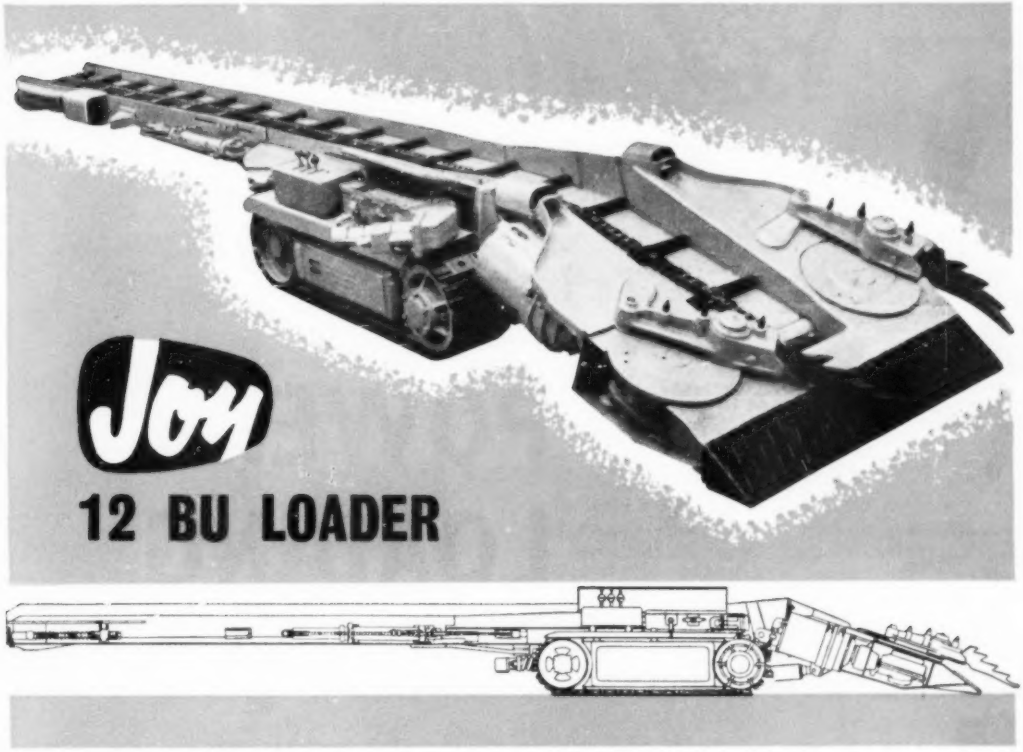

the answer
to every chain
question
IN THE RANGE FROM 7/32" TO 1 1/4" INCLUSIVE
Parsons
Chains
PARSONS CHAIN COMPANY LIMITED, STOURBRIDGE-ON-SEVERN, WORCESTERSHIRE



—standard practice for mechanised thin-seam mining.

In recent years the tendency in many British Mines has been to base loading systems on that well-proven JOY machine—the 12 BU Loader. Nor are the reasons hard to find. The 12 BU Loader works in seams down to 30-inches high: the rated capacity is one ton per minute: the width is only 56", and with articulated rear conveyor and independently operated crawler tracks it is extraordinarily manoeuvarable.

20 years successful operation of this machine has provided ample proof of its performance and reliability under widely varied conditions.

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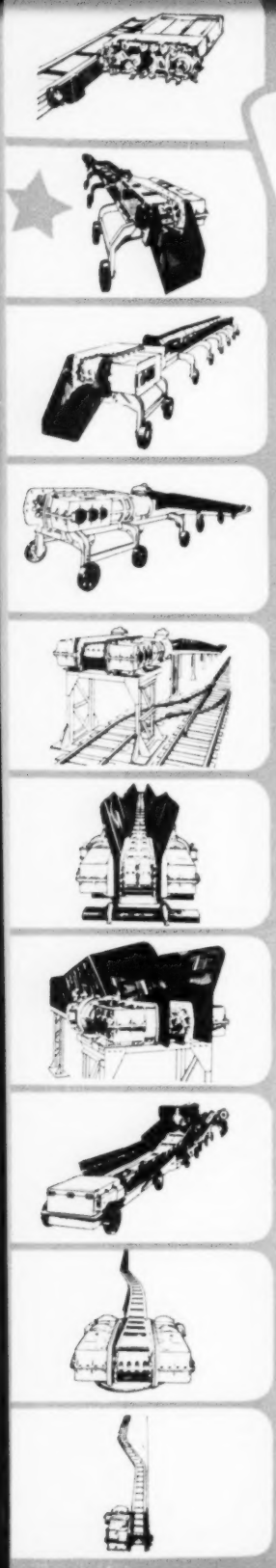

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Crawley products are of high capacity, rugged in design and low in maintenance cost. They have a high degree of standardisation and interchangeability of parts, and offer an efficient and sure solution to the conveying and power loading problems common to the longwall system of mining throughout the world.

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CAPACITY 250-350 TONS/HOUR

Standard length 19 yds. with 8 yds. coverage over 36in. belt. Supporting structure is available for all belt widths. Length and belt coverage may be increased if required.

The drive frame is machined as standard on both sides enabling either left or right hand fixing, with 20 or 50 h.p. gear box as required. Chain speed from 150 to 220 ft. per min. to suit individual conditions.

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- LOW MAINTENANCE COST
- ALL CRAWLEY HEAVY DUTY MACHINES HAVE THE FOLLOWING UNITS STANDARD AND INTERCHANGEABLE.

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- CHAIN
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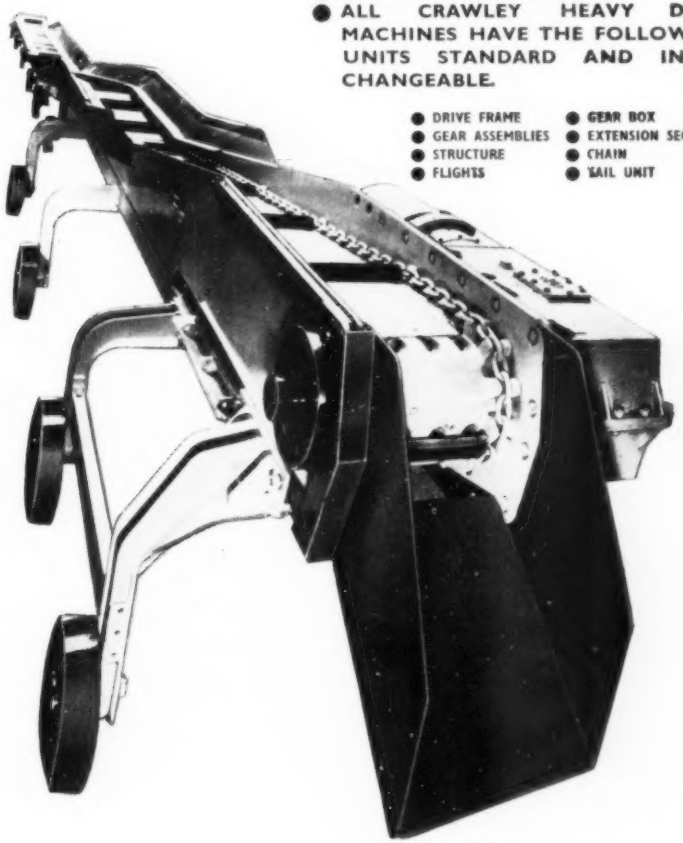

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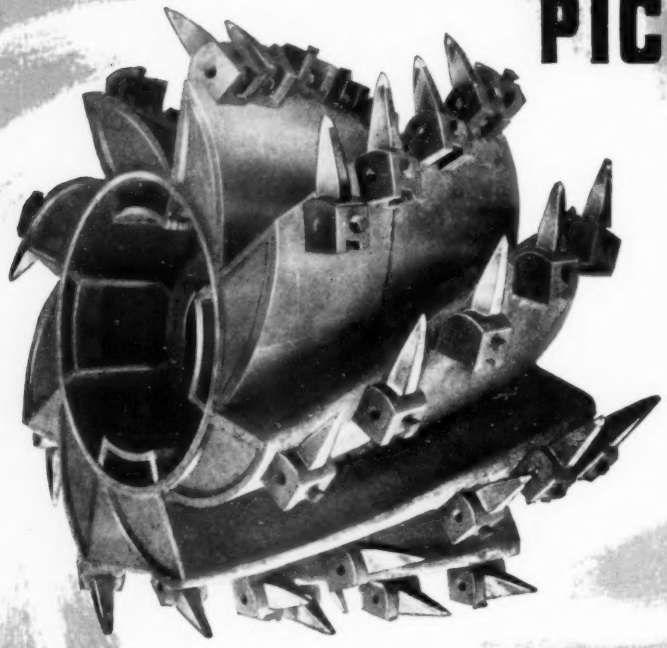

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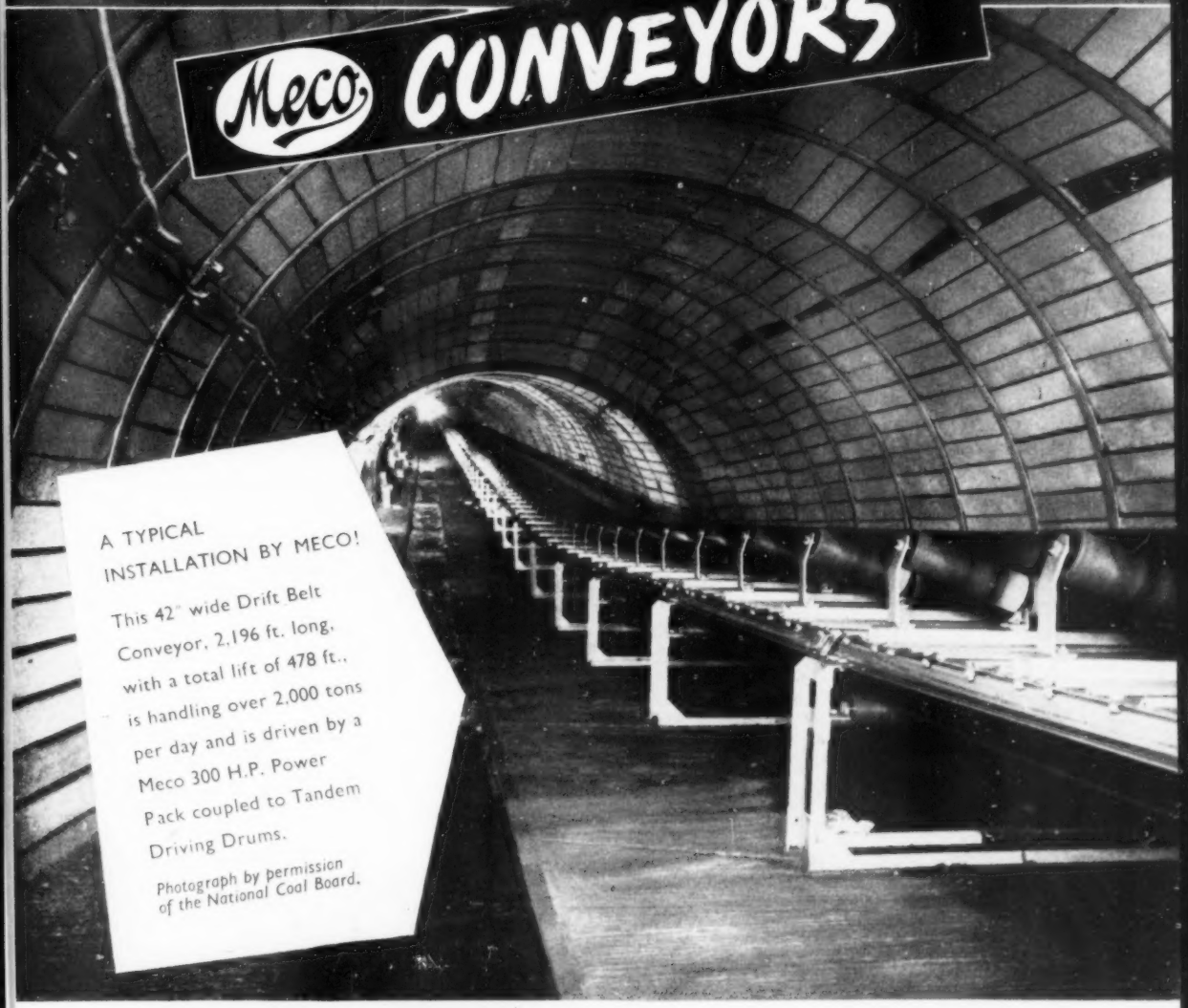
NOW! MAJOR DRIFT TRANSPORT BY—

Meco CONVEYORS



A TYPICAL INSTALLATION BY MECO!

This 42" wide Drift Belt Conveyor, 2,196 ft. long, with a total lift of 478 ft., is handling over 2,000 tons per day and is driven by a Meco 300 H.P. Power Pack coupled to Tandem Driving Drums.

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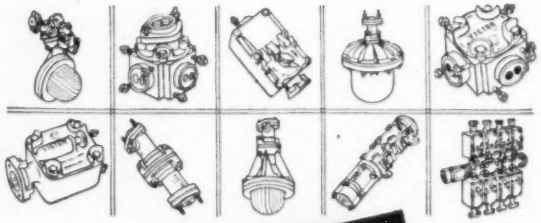
The VICTOR range of Certified Flameproof Lighting Fittings has been designed to meet the needs of the modern mining engineer.

Flexibility of design permits development from a single light to a district feeder point comprising switches, fuses, distribution boxes etc. The basis is a number of unit fittings and equally simple accessories capable of being plugged one into the other to build up any combination of lighting needs.

Thus lighting arrangements can be speedily extended or modified—or dismantled with equal facility.



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BTR CONVEYOR BELTING

Steel production, from quarry face to finished stock, calls for the best of equipment . . . for conveyors this means BTR-engineered belts. That's why Richard Thomas & Baldwin Ltd installed BTR belting at Ystrad, near Ebbw Vale—to meet and beat the challenge of heavy, belt-punishing limestone.
For your conveyors, whatever the load, there is a BTR belt that's right for the job!

I/3205

STEEL–A RECORD YEAR

Biggest-ever output flows from Britain's busy furnaces

BRITAIN'S steel production in 1960 was the greatest ever recorded: over 24 million ingot tons. Output was running close to capacity in almost every section of the industry. Total production was *twenty per cent* above 1959.

Britain's capacity to produce steel has been increasing by leaps and bounds as a result of the £900 million which has been spent on three great development programmes. Last year alone the steel industry spent £130 million on development, *one-sixth* of all the money spent by manufacturing industry on capital investment in this country.

In the next four years the industry has already planned to spend another £450 million, and to raise its production potential by nearly one-third.

Another article on the opposite page describes a great new development in Scotland, which brings with it the promise of greater prosperity across the Border. Also in hand is a vast project near Newport, Monmouthshire. This is the Spencer works of Richard Thomas & Baldwins, which when completed will be Europe's most modern integrated steelworks. An enormous green-field site has been laid out, and work is going ahead at a tremendous pace.

Expansion under way

Three more new mills to roll improved and more efficient sections for building and constructional work will come into operation shortly at Colvilles, South Durham and the United Steel Companies.

Among the very large schemes announced in 1960 were the Tinsley Park scheme of the English Steel Corporation to increase their output of alloy and special steels, costing £26 million; the United Steel Companies' plans at Appleby-Frodingham and Samuel Fox, costing £32½ million; a Dorman Long plan costing £36 million; and the entirely new works at Rotherham of the Park Gate Iron and Steel Company which will cost £55-60 million.

Prospects for '61

What are the prospects for 1961? The industry will be able to improve on the 1960 record figure. Capacity in 1960 was nearly 26 million tons – this year it will be 27 million tons. All the time, the industry is expanding to meet future demand. This expansion is geared, not to any yearly fluctuations in our manufacturing activity, but to the steadily rising curve. It is in the confidence that this curve *will* go on steadily rising, that the many far-reaching development plans in steel are being pressed forward without slackening.

Exports a record too

Besides the enormous amount of steel which Britain exported last year in the form of manufactured goods, the steel industry's own direct exports of steel were booming.

Over 4 million ingot tons, valued at some £230 million, went into direct exports of steel in 1960 – a post-war record.

Latest available figures show that well over one-third of this went to Commonwealth countries: exports to the Commonwealth were 20% up on 1959 in tonnage. Tonnage of exports to Western Europe showed a similar upsurge. Exports to the Soviet Bloc including China, though small by comparison with total exports, also showed an increase.

Two new steels for supersonic flight

What will the supersonic airliner of the future be made from? Opinions are divided, but the Bristol T.188 research plane, which has been built to explore the problem of flight at speeds of the order of 1,800 m.p.h., is made from heat-resistant stainless steel to withstand the high temperatures caused by the friction of the air at such speeds.

The steel scientists of Sheffield have produced two new types of steel from the experience of the Bristol T.188. Although heat-resisting alloy steels had already been in use in jet engines for many years, these were not suitable for making large thin sheets of the kind required to build an airframe. The new steels produced in Sheffield are capable of being made in large sheets, and can be "worked" into the complicated shapes required.

New bridges hang on steel

The new road bridge over the Firth of Forth is being anchored into the solid rock with specially thick steel cables. They are 1¼ in. in diameter and have a breaking load of more than 350 tons. Over a thousand of these cables, enclosed in groups of four in 4½ in. diameter steel tubes, are embedded 240 feet into the rock. Other similar cables are being used to support the 110 ft. high towers until the main steel suspension cables are in position.

Other new bridges using steel suspension cables are planned over the Wye and Severn. Altogether some 70,000 tons of steel will go into the three bridges.

STEEL–THE YEARS AHEAD

New strip mill promises brighter future for thousands *BY MARGARET STEWART*

THERE is no problem of mass unemployment in Britain today as there was before the war. But there are still black spots. Scotland has 72,000 jobless, 3.3% of all its workers. In Greenock and Port Glasgow the proportion is as high as 8.1%. The national average is 1.6%.

New light industry has brought 50,000 jobs to the Clyde valley since the war. But Scotland is still over-dependent on heavy industry.

The steel industry is playing a vital part in redressing the balance, and bringing hope of an industrial renaissance. Colvilles, one of the leading British producers, are going ahead with ambitious plans to raise their steel-making capacity from 2·3 to 3·3 million tons a year. Their most important and imaginative project will produce 500,000 tons of steel sheet and 175,000 tons of light plates a year. It is in two parts – a hot strip mill at Ravenscraig and a cold reduction mill at Gartcosh, 8 miles away.

This is a completely new development for Scottish industry, traditionally a user of heavy steel. The Scots hope that plentiful supplies of sheet steel will attract manufacturers of cars, car accessories, refrigerators, washing machines, cookers, and office furniture. A canning industry could follow. Rootes and the British Motor Corporation have already decided to go north.

Snowball effect

Sir Andrew McCance, chairman of Colvilles, told me: "But for the strip mill, these motor car firms would not have elected to come to Scotland. They will bring a lot of ancillary trades, and the cumulative effect is bound to be substantial."

Mr. John Lang, steel union leader, chairman of the Scottish Board for Industry, and treasurer of the Scottish TUC, said there had been many encouraging enquiries.

The Government's decision to lend Colvilles £50 million for Ravenscraig caused controversy in Parliament. Labour spokesmen said it was wrong to use public money for the benefit of shareholders. Conservative back-bench MPs attacked the loan as "bastard socialism".

But the Scot-in-the-Street was spoken for by Mr. Lang: "We don't care a damn where the money comes from, so long as our men don't have to walk the streets looking for jobs."

Plans are going ahead in spite of the recession in the car industry. What extra employment will result? Perhaps another 1,500-2,000 steel workers will be needed. The car developments should provide upwards of 10,000 jobs directly. The Pressed Steel Company is expanding its plant near Paisley to produce bodies for cars and commercial vehicles. A new development by the accessory firm of Rubery Owen, scheduled for Bathgate, will mean work initially for about 200. And there will be a "snowball" effect from these developments within the next few years.

MARTIN: "A dandy layout"

100% success

It was stimulating to visit the Ravenscraig and Gartcosh sites. The men on the job impart their own infectious enthusiasm.

William Banks, general manager of Ravenscraig, has watched its progress for three years. "I have a great deal of faith in the future of the steel industry, and of our company in particular," he said. "I believe we shall have 100 per cent success."

More steel-making capacity is being installed to supply the new mill. Ravenscraig will be one of the first large plants in this country to adopt the "L.D.-A.C." process, one of the most modern and economic methods of making steel, using oxygen and lime.

About two-thirds of the output of the hot strip mill will be sent to Gartcosh to be cold-rolled into high quality sheet.

There is a strong reason for building at Gartcosh. Nine hundred men work there in the old hand mills of Smith and McLean. Their livelihood depends on steel.

Progress at Gartcosh, as at Ravenscraig, is well up to schedule. George Martin, the "boss", told me that American experts to whom he showed the plans had commented, "That's a dandy layout."

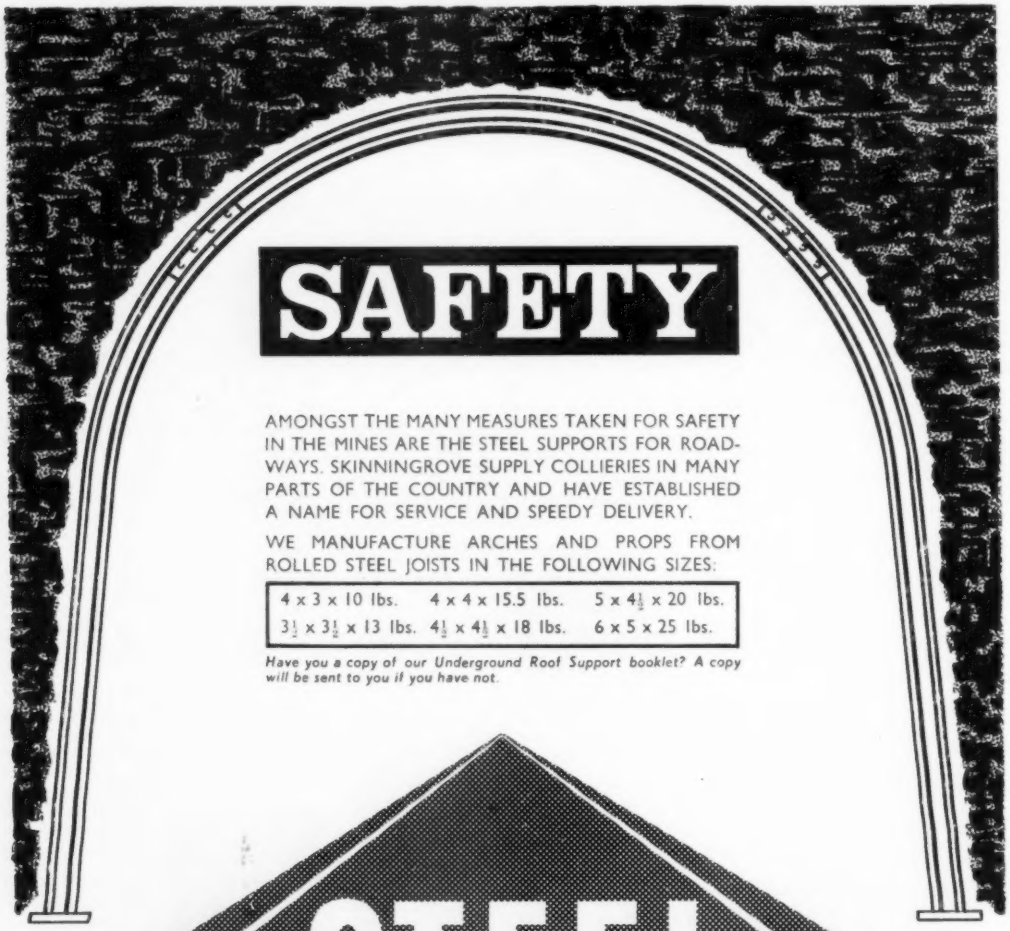
At first 500 men will be employed, rising to 1,000. Most of Smith and McLean's men will be found work. "We will go out of our way to place them in suitable jobs," I was told.

The two men who will manage the hot and cold strip mills are both in their early thirties. James Watson, manager-designate of the hot strip mill at Ravenscraig, is 34. His opposite number at Gartcosh, James Easton, is 31. Both have been through Colvilles' 'sandwich' courses at the Glasgow Royal College of Science and Technology. Both are brimful of confidence in themselves, their industry and the future of Scotland.

WATSON: "Finest thing that ever happened"

Says Watson: "This is the finest thing that has ever happened to me." Says Easton: "The prospects couldn't be better."

The articles on these two pages form part of an advertisement published in the Press by the British Iron and Steel Federation



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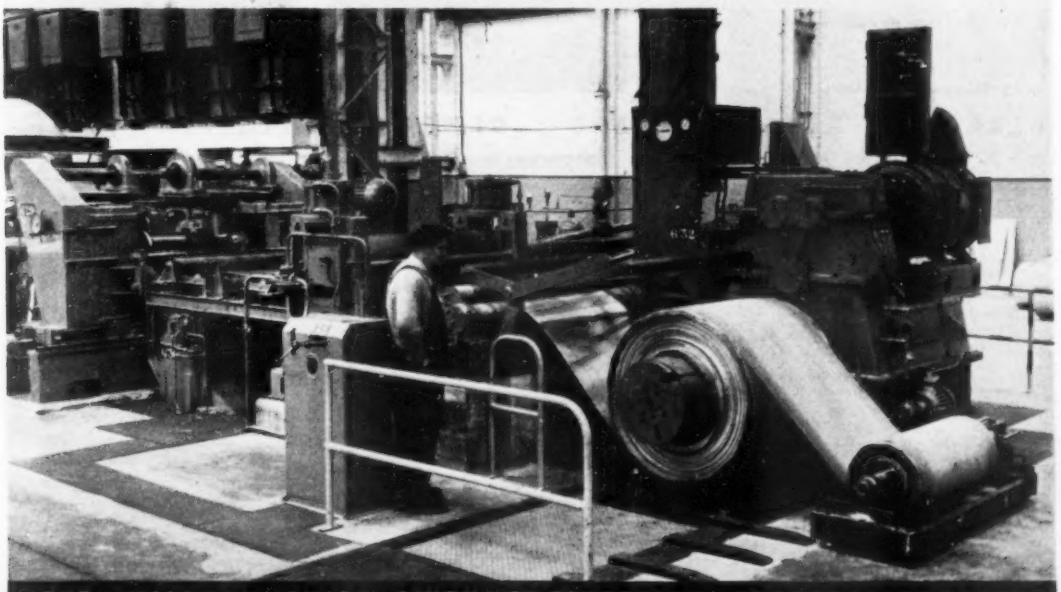

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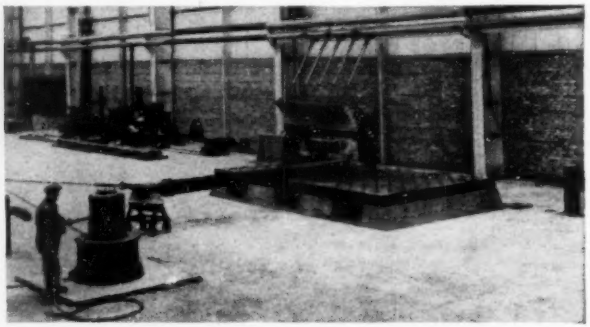

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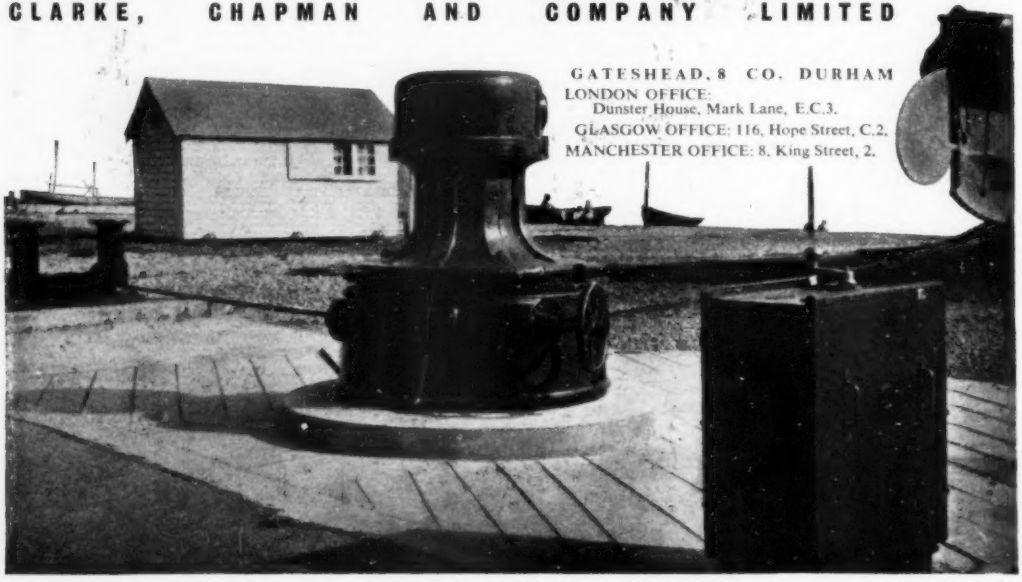

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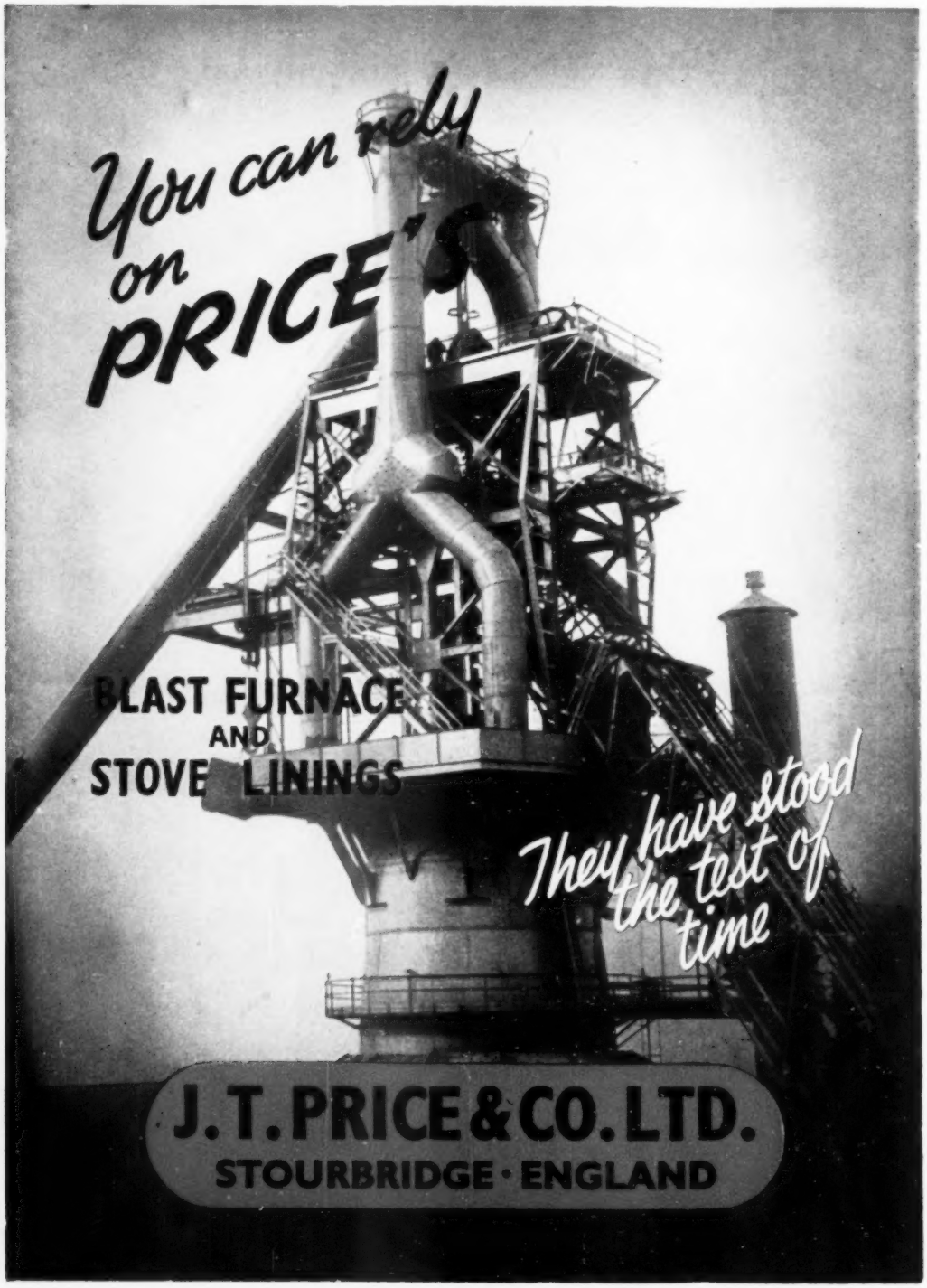
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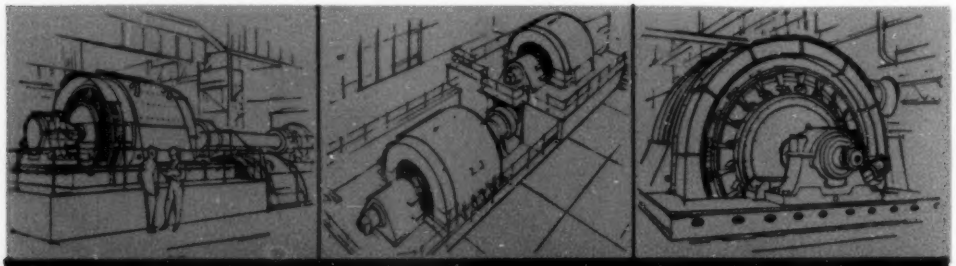

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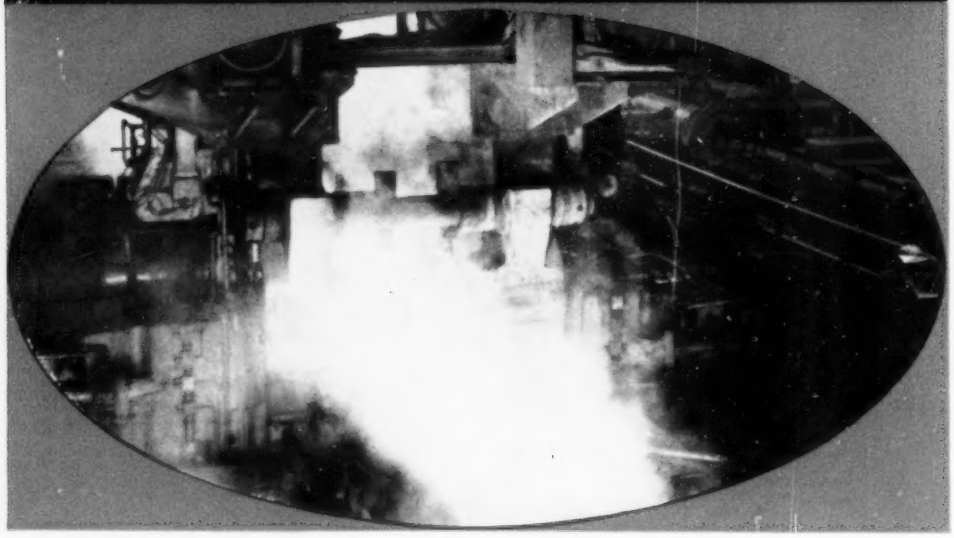

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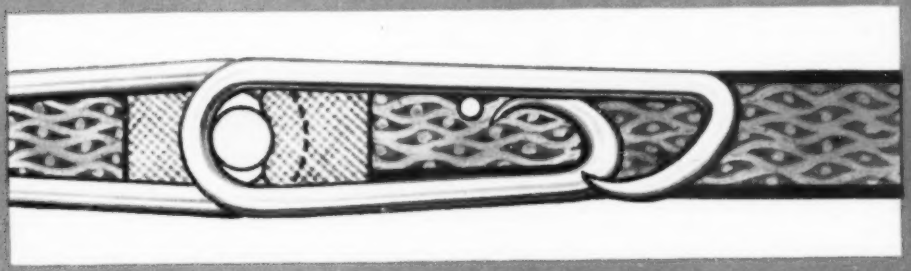

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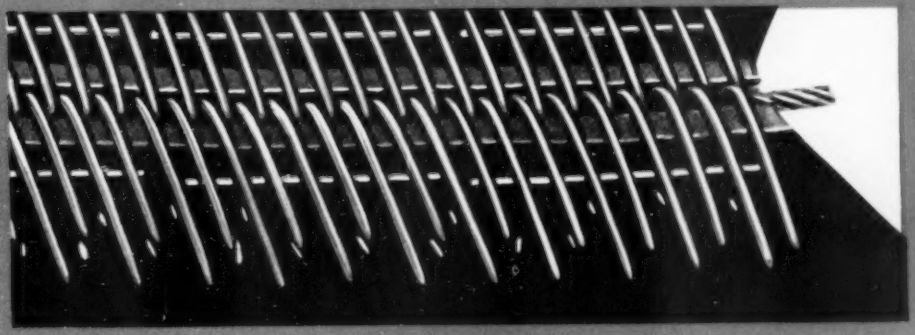

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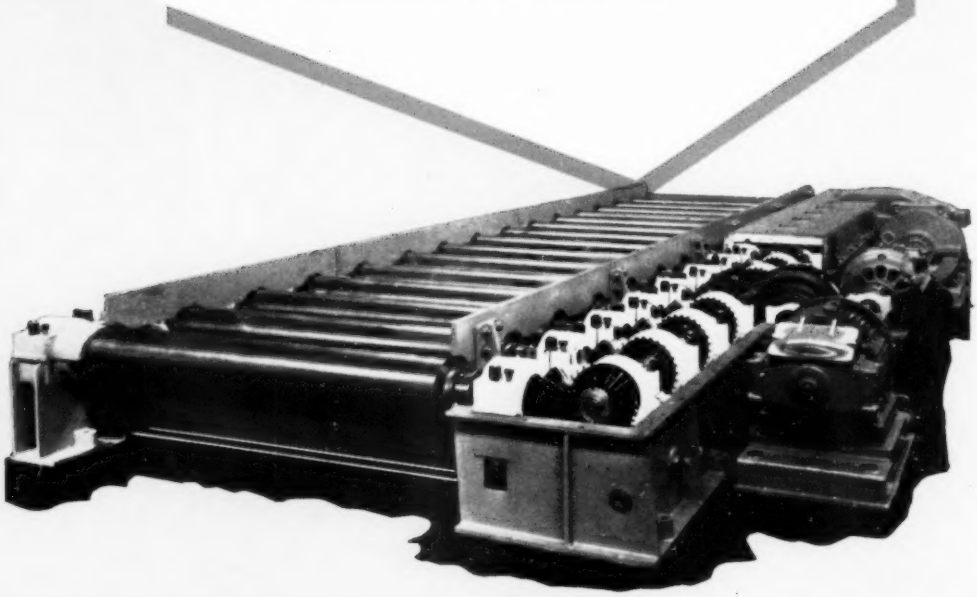

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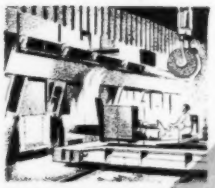

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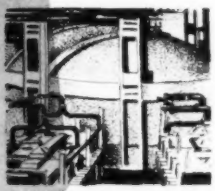

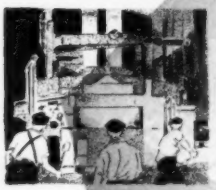

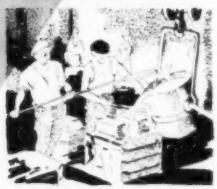

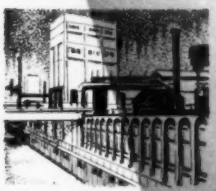

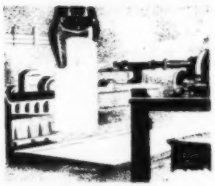

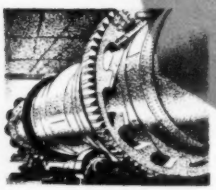

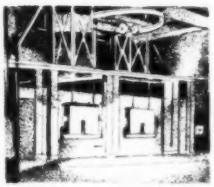

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Published each Friday

Annual Subscriptions: *United Kingdom....52s.*
Abroad...60s. *Payable in advance*

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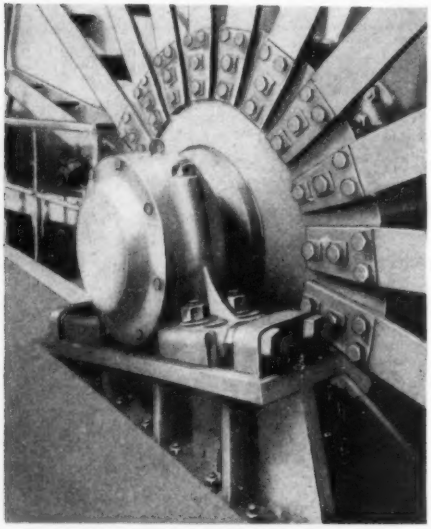

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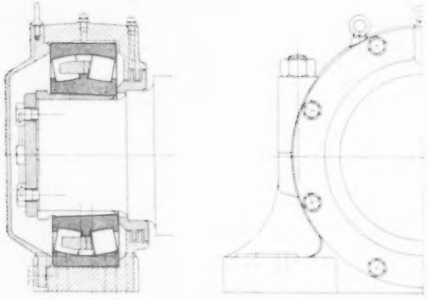

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THE IRON AND COAL TRADES REVIEW

Vol. 182 January 13, 1961 No. 4,826

Technician's Charter

EDUCATION of technicians for industry has for long been one of the most neglected sides of the British educative system. Industry's need of technicians—the technologists' chief assistants—in increasing numbers is in no doubt, as a recent survey made by the Ministry of Labour has revealed. There is every reason, therefore, why industry, which has in some branches suffered severely from a lack of trained technical assistants, should welcome and support the major reorganization of technical education which the Minister of Education, Sir David Eccles, envisages in a White Paper, "Better Opportunity in Technical Education,"* published last week.

Two of the chief objects of the White Paper are to forge better links between schools and technical colleges, and to provide, in Sir David's own words, a "technician's charter." Although we are still far behind Russia and America in training scientists and technologists, there has been a great improvement in the number of students taking sandwich couses leading to higher education since the White Paper of 1956. But no major move has been made for many years to encourage those who are not likely to make the technological grade to become technicians, with a status and educational background of their own. Apart from improving the educational lot of technicians, the White Paper looks forward to great improvements in the opportunities for craftsmen and operatives.

From the point of view of the youngster who desires a technical education, present conditions could scarcely be less helpful. Between leaving school and taking up an apprenticeship evening courses have provided, without striking success, the only link. The White Paper lays down that students should start at a technical college immediately after leaving school, and that preliminary courses in evening schools should be discontinued. It also says that more care should be taken in the selection of students for courses and that colleges should experiment with full-time induction courses and with tutorial methods. Where the technician will really come into his own, however, is in the nature of the courses. Many students struggle with National Certificate and Diploma courses which are really too difficult for them. Somewhat naturally they give up before completing the course, and in this wastage industry loses far too high a proportion of good material, unsuited to become technologists, but highly suitable to make valuable contributions to industry as trained technicians. Sir David envisages courses to include National Certificate and Diploma courses for students aiming to become at least high-grade technicians, technician courses devised specifically for particular industries, craft courses, and courses for operatives: in fact, standards that will enable all grades of skilled ability to give of their best to industry. It will help to obviate the high rate of failure on the present National Certificate, which has often discouraged employers to let their employees attend day-release courses.

Apart from these improvements, the Minister envisages other changes, one of his main aims being to broaden technical education and intensify the general educational value of the courses. His belief, which industry must surely share, is that amid the rapid changes of this technical age it does not do to train a young person too narrowly to one particular job or skill. He intends that the Ordinary National Certificate course shall last two instead of three years, and that the standard of entry shall be raised. There will be new courses of four or five years specially for technicians, and new general courses will be introduced, leading to either technician courses or Ordinary National Certificate and Diploma courses. Craft courses will be modified in various ways, and Sir David wants to see courses for operatives vigorously developed.

The Minister is insistent that more time should be provided under day-release schemes and that no student should have to rely wholly on evening study. The method by which this extra time is to be achieved is still being considered. The Crowther report mentioned three possibilities—a longer period of day release each year, providing 44 days instead of about 36; block release courses, of some weeks' duration, to make more than 240 hours; or sandwich courses. It is the Minister's intention, in any case, that sandwich courses, especially for technicians, and block release courses should be increasingly developed.

The Minister, who has consulted more than 1,000 bodies in industry and education before drawing up this White Paper, has asked local education authorities and colleges to give early consideration to the proposals which call for action on their part and to co-operate to the fullest possible extent with the City and Guilds, Joint Committees for National Certificates, and other bodies

(Command. 1254. HM Stationery Office, 1s. 3d.)

which will be concerned with the preparation of the new courses and the revision of the old ones. Sir Harry Pilkington, chairman of the National Advisory Council on Education for Industry and Commerce, has welcomed the White Paper for the contribution its proposals would make to industrial leadership in the next generation. It would, he said, be widely supported by all on the council representing educational authorities, both sides of industry, the professional institutions, and the examining bodies. Future leadership in this age of swift technical change is one of industry's fundamental needs. Of more immediate moment is the guiding of a higher proportion of students into the type of course best suited to their abilities. Here, industry has an important task to carry out, without delay. Students' abilities must be fashioned to suit the types of job which will be waiting for them. It is up to all industries to define precisely for the City and Guilds and other examining bodies the jobs for which courses for technicians are going to be required.

19,000,000 Tons of Coal a Year from Scotland

STABILIZED Scottish coal industry producing 19,000,000 tons of coal a year with a labour force of about 70,000 is planned for 1965, Mr. Alfred Robens, chairman-designate of the National Coal Board, said on Tuesday after a two-day visit to the Scottish Division of the NCB. He said that during that period it was likely that more than one plant for the manufacture of smokeless fuel would be established. Some Scottish coal had already proved suitable, but quantities and sites for plants had still to be investigated.

The falling-off in the working force in the industry had been due largely to a mistrust of the future, but the recent new sinkings and major developments had proved reassuring. In 1961, Mr. Robens said, it was hoped to recruit between 7,000 and 8,000 to the pits in Scotland, and the labour force would stabilize at almost 70,000.

On the future output of 19,000,000 tons of coal a year from Scotland—a rise of 1,250,000 tons over current production—Mr. Robens said: "We have spent the capital and will put in the machinery and it is up to men and management to produce this amount." For the miners, he looked forward with confidence. He was certain that output would be maintained, carrying with it security of employment.

Scots Colliery to Reopen

SOUTHFIELD Colliery, Shotts (Lanarkshire), closed in 1959, as uneconomic, will be reopened to provide a short cut to the coal face in the neighbouring Northfield Colliery, which is to close in September. Miners from Northfield, who at present have a 2-mile underground journey to get to the coal face, will go down from Southfield.

The coal to be worked is only 750 yds. from the Southfield shaft and there is a connecting underground roadway between the two collieries. The coal will still be brought to the surface at Northfield.

Personal

Chairman of Coalite & Chemical Products, Limited, Chesterfield, Comndr. COLIN BUIST was made Companion of the Victorian Order in the New Year Honours.

Resident engineer since 1951 of the Scottish works of Babcock & Wilcox, Limited, Mr. C. H. DAVY is returning to London to take up duties on February 1 as executive director at head office.

Mr. W. J. ALLAN, group sales manager for Summersons Holdings, Limited, railway plant engineers, ironfounders, etc., of Darlington, has resigned to take up another appointment in South Africa.

Mr. G. B. PRICE, founder of the social services organization of Steel, Peech & Tozer, Limited, branch of the United Steel Companies, Limited, has retired after 50 years' association with the company.

First member of the staff to achieve 50 years' service with the Lumsden Machine Company, Limited, Gateshead, is Mr. STANLEY ROBINSON, senior draughtsman. He was presented with a cheque for £250 by Mr. E. G. BLAKE, chairman and managing director, who also will complete 50 years' service this year.

The Minister of Labour, Mr. JOHN HARE, is to start a three-day visit to shipyards and marine engineering industries in the North-east of England on Tuesday. On Wednesday he will dine with members of the North-Eastern Industrial & Development Association and the following day he will have lunch with representatives of the ship building and repairing industry in Newcastle-upon-Tyne.

Three senior engineering executives of Leyland Motors, Limited—Mr. J. MCHUGH, chief engineer (vehicles), Mr. G. WARING, proving and development engineer, and Mr. J. MCGOWAN, presswork and section engineer—flew to the US last week to attend the 1961 International Congress and Exposition of Automotive Engineering, which was organized by the Society of Automotive Engineers.

Staff presentation was made recently to Mr. W. E. BALLARD, managing director of Metallisation, Limited, metal spraying specialists, of Dudley (Worcs), who is retiring soon, but will remain on the board. He will be succeeded by Mr. Eric Bulley. Mr. Ballard joined the company in 1923, a year after it was formed. He served as honorary secretary of the Association of Metal Sprayers from 1936 to 1948, and was chairman in 1951. His book "Metal Spraying and Spraying Metal" is a standard work of reference.

UK Consultants' Steel Plant Proposals for Pakistan

PROPOSALS for the construction of a 250,000-ton steel plant which have been submitted by the British consultants, John Miles & Partners (London), Limited, have been accepted by the Pakistan Government. The proposals will now be sent to a number of foreign firms who will be invited to make concrete offers of participation by the end of March.

It is understood that the consultants' proposals cover a number of schemes varying in cost and that the Government has chosen the cheapest. The aim is for work on the plant to start as soon as possible and for the plant to be in production within the next three years. The Government intends to accept foreign participation to the extent of 40 per cent. of the total cost, the rest of the capital to be contribued by local interests.

Coal in 1960

SIR JAMES BOWMAN'S LAST ANNUAL REVIEW

THERE was no wistful retrospect in Sir James Bowman's report on the coal industry's performance presented at a Press conference in London yesterday (Thursday). It may have been a valedictory report—Sir James retires from the post of chairman of the National Coal Board at the end of the month—but it was full of confidence and buoyant enthusiasm for the future and quiet pride and satisfaction in the achievements of the industry in 1960. And in spite of the critics, it was a year of considerable progress in all spheres—from increased productivity to improved safety in the mines.

Taking his last point first—"Prospects for 1961"—Sir James admitted that the industry in 1961 still had many difficulties to overcome, but it had emerged successfully from the severe test of cutting output without impairing its ability to meet the demands the nation was likely to make on it, and without inflicting widespread hardship.

Provided that expectations of a rising energy demand were fulfilled, he said, no further drastic contraction of the industry, accompanied by heavy stocking, should be necessary. Coal should continue to command a market about the same size in total as at present; the application of the board's plans would ensure an output to meet this demand at a high standard of efficiency.

Real Progress Made

It was estimated that, subject to any unforeseen changes in the economy, total consumption would be about the same as in 1960. Real progress had been made in cutting costs and improving service to the consumer and there would be development of the technical and sales service and the advertising and publicity campaigns.

Small quantities of new smokeless fuels from the two pilot plants would be available for testing and, if the results were satisfactory, commercial-scale plants would be developed to achieve the board's aim to be producing, by 1965, 1,000,000 tons of premium domestic smokeless fuel in addition to that being manufactured now.

Now that output had been reduced to a point below the level of demand there need be no misgivings about the security of employment in the industry—indeed, more men were needed now, particularly in the expanding coalfields of Yorkshire, the Midlands, and South Wales. Now that the demand was no longer for coal at almost any price, some of the highest-cost output had been eliminated and work would continue in this direction. Efficiency was now at the highest peak ever reached and higher levels would be attained this year when there would be a further rapid increase in mechanized output and concentration of working.

Reviewing the past year, the chairman said that annual consumption of coal (including exports), which fell by 33,000,000 tons between 1956 and 1959, increased during 1960 and the NCB sold 10,000,000 more tons than in the previous year. Power stations consumed 5,000,000 tons more, coke-oven consumption was nearly 3,000,000 tons higher, and the domestic market took 2,000,000 tons more. Deep-mined production dropped by 9,000,000 tons and open-cast by 3,000,000 tons.

The board was able to lift more than 6,000,000 tons from undistributed stocks—which in the previous year had increased by 16,000,000 tons and during the last quarter of the year stocks were being lifted at the rate of nearly 400,000 tons a week—a much higher rate than that at which they were being put down a year earlier.

Production, already at record levels in 1959, continued its upward climb to the highest ever reached in the history of the industry. Output per manshift for all workers at nearly 28 cwt. was nearly 4 per cent. higher than in 1959 and over the past three years productivity had increased by 12 per cent.—a greater rise than the average increase for the rest of British industry. Percentage of coal power-loaded rose from 32 per cent. in 1959 to more than 38 per cent. in 1960.

Improvements achieved through rigid economy and a high rate of efficiency represented savings at the rate of about £50,000,000 a year, compared with 1957, but measures which had to be taken to bring output into line with demand cost the board dearly. Though stocks were reduced the board had to carry heavy financial burdens from stocking and from the loss of highly profitable open-cast output, with the result that coal prices had to be raised—for the first time since July, 1957.

Recruitment, deliberately restricted in recent years, was stepped up in the second half of 1960 and by the end of the year was slowing down the decline in the labour force. This had fallen from 634,000 to 582,900. During 1960, 44 pits were closed bringing the total number of closures in the last three years to 136, of which 83 were caused by complete or virtual exhaustion, or because of mergers. For the second year in succession the only open-cast operations carried out were those to which the board was already committed. Of the 15,000 men affected by last year's closures only 250 were unplaced in jobs by the end of the year. Partial closures and reorganization affected a further 5,000 men of whom about 350 were without alternative work.

Total deep-mined production in 1960 dropped to 183,860,000 (192,500,000) tons, or 4.5 per cent., licensed mines and other coal dropped to 2,280,000 (2,780,000) tons, or 18 per cent., and open-cast production dropped to 7,580,000 (10,830,000) tons, or 30 per cent. The total decline for the year was 193,720,000 (206,110,000) tons, or 6 per cent. Overall output per manshift rose to 27.9 (26.9) cwt., or 3.6 per cent.

Inland coal consumption has dropped from 213,000,000 tons in 1957 to 197,100,000 tons last year, but this is 7,500,000 tons better than in 1959. Exports showed a similar trend—falling from 7,900,000 tons in 1957 to 4,300,000 tons in 1959 and then rising to 5,600,000 tons last year.

Inland consumption began to increase in the early

spring and by the end of the year had reached 197,000,000 tons—the increase of 7,500,000 tons being the biggest for any single year since 1948. The increased demand came from three of the biggest classes of consumer—power stations took more small coal, the steel industry more coking coal, and householders bought more coal and boiler fuel. There was a slight fall in sales to the gas industry and a greater one in sales to railways. The general industrial market, where oil competition is particularly strong, took only a little less than in 1959.

The main reasons for the improvement in sales were the higher level of industrial activity generally, bad weather during the summer, and the increasing effects of the board's sales promotion campaign. Bad weather and the stimulus provided by the introduction of the Housewarming Plan caused demand in the house coal market to rise much earlier in the year.

Coal Direct to the Consumer

Referring to special arrangements to avoid serious delays occurring through shortage of transport, Sir James said one of the effective steps taken so far had been to arrange for special through trains carrying large consignments of coal direct from the colliery areas, thus avoiding congestion at junctions and marshalling yards. These direct services had been increasing since October, 1960, and were providing greater flexibility in railway operation. Substantial supplies, especially for power stations, have also been diverted from rail to road transport.

So far as exports were concerned there was a rise in the tonnage exported, but competition from American and Polish coal and from other fuels continued to be extremely keen and continental coal-producing countries still held high stocks. Several West European countries had taken action to protect their own coal industries; for example, Germany had taxed all heating oil and put a duty on coal imports above a certain level; Belgium had introduced Government subsidies for the coal industry, a tax on fuel oil, and restrictions on coal imports, and the French Government had taken action to the same end.

Continuing its policy of reducing production below the level of demand in order to draw coal from stock, the board had been able in 1960 to pick up a greater part of its stocks than was expected a year ago. Stocking started in 1957 to maintain the capacity needed to meet demands likely to be made on the industry in the future and to avoid the social effects of the too-rapid run-down in output had enabled the industry to meet last year's substantial rise in demand, and avoid widespread unemployment in the coalfields. The provisional figure for distributed stocks (sold, and held by consumers and house-coal merchants) at the end of 1960 was 13,400,000 (14,300,000) tons, and stocks at collieries and open-cast sites, 29,400,000 (35,700,000) tons.

Recruitment was resumed in most areas in the second half of the year and the loss of men fell to about 300 a week in the last weeks of 1960, compared with a weekly loss of 1,400 a week during the first six months of the year. Total recruitment in 1960 at 43,000 was about 16,000 higher than in 1959. Recruitment of juveniles, which had not been so severely restricted, was 1,700 higher than in 1959, there were about 11,000 more re-entrants, and 3,000 more new adult entrants.

All divisions increased their productivity with the East Midlands reaching nearly 120 cwt. a manshift at the coalface and 42 cwt. for all workers. Once again the highest productivity was achieved in the Midlands and Yorkshire coalfields which are among those scheduled to increase their output in the future. Productivity in all divisions increased both on mechanized and non-mechanized coal faces. The average number of manshifts at the coal face needed to produce 1,000 tons of coal during the first 11 months of 1960 was 252: on conventional faces it was 277, but on power-loaded faces, only 174.

Sir James made reference to the disaster at Six Bells Colliery, Abertillery (Mon) in which 45 men lost their lives, and said that the accident rate for every 100,000 manshifts worked showed very little change. The provisional number of fatal accidents at NCB mines was 314 (343) and serious non-fatal accidents 1,576 (1,662). Since 1947 there had been a steady improvement in safety in the mines: this progress was encouraging but the board intended to give the problem unremitting attention to secure further improvements.

The number of major colliery reconstructions completed during 1960 was 33: another 127 schemes are still in progress.

Capital expenditure during the year was about £90,000,000—£20,000,000 or so less than in 1959, which was the peak year of expenditure. It is not expected that there will be any reduction in the level of expenditure forecast in the Board's plans previously announced for the period up to 1965.

Two examples of increased efficiency resulting from reconstruction, quoted by Sir James, were at Ellington Colliery in Northern (N&C) Division, where overall OMS went up from 23.8 cwt. in the year before reconstruction to 43.5 cwt. in the first nine months of 1960; and Linby Colliery in the East Midlands, where it increased from 36.6 to 60.8 cwt.

Recent Wills

Maj. S. Walton-Brown's Mining Bequests

MAJ. STANLEY WALTON-BROWN, former managing director of Seghill Colliery, Limited, member of the council of the Mining Association of Great Britain and of the Northumberland Coalowners' Association, and president of the National Association of Colliery Managers in 1939 and 1940, who died in August last year, left estate valued at £60,974 (gross). Included in his will is a bequest to the North of England Institute of Mining and Mechanical Engineers for the creation of a Stanley Walton-Brown Prize Fund, to provide a special medal and prize to one member of the Institute rendering special service, and the Martin Walton-Brown Fund, in memory of his late father, for the purchase for the library of mining relics or books.

A bequest is also made to the North of England branch of the National Association of Colliery Managers, setting up a fund for awards for purposes which may be chosen, "one of which might be the promotion of greater safety in coal mines." A similar bequest is made to the North of England branch of the Association of Mining Electrical and Mechanical Engineers, and provision is also allowed for a trust fund for Kings College, University of Durham, to help students in need of financial assistance.

PARROTT, WILLIE, deputy at Wentworth Silkstone Colliery, near Barnsley (Yorks) £4,266

BALDREY, W. C., managing director of William Jones, Limited, railway material manufacturers, of London, W.1 ... ... £19,125

HAMILTON, LT. C. G. H., chairman of Tarslag, Limited, and a director of Expanded Metal Company, Limited £52,375

Prospect for SCOW

CHAIRMAN ON PROGRESS AND DEVELOPMENT

PRODUCTION in all divisions of the Steel Company of Wales, Limited, in the first two months of the current year has been slightly in excess of the same months in 1959, states Mr. Harald Peake, chairman. The progress made by the company, justly claimed to be remarkable, will continue and the prospects are good. The order-book is not quite so full as a year ago, but orders for the first and second quarters of 1961 are "coming along quite well."

Mr. Peake, in his annual statement to shareholders, says that with the expected availability of increased oxygen supplies by end-March, 1961, steel production capacity is likely to increase.

He points out that there are some signs of recession in world trade, and if the tendency were to spread, results for the current year could suffer. From the national point of view, the important thing is to avoid a return of inflation. It is also important to increase productivity further and to lower costs.

Fourth Development Plan

Mr. Peake believes that "with real understanding and co-operation between managements and men, these objects can be achieved." In the long run, he says, it is the price at which products can be sold that decides whether full or short time is worked.

By the end of the year to October 1, 1960, all of the units comprising the third development plan, which may now be regarded as complete, have proved they are able to achieve their designed production rate, while encouraging progress is being made with the fourth plan. The increased capacity from the latter is expected to be available at the end of 1962.

While the need for further plans is kept constantly under review, states Mr. Peake, it seems likely that a period for consolidation will follow completion of the fourth plan. Capital commitments at the year-end were £29,000,000. The greater part of this is in respect of the fourth plan, and capital expenditure will continue at a high level throughout 1961-62.

The full order-book enjoyed throughout 1959-60 enabled production and profits to be increased in accordance with expectations. The results also reflected more economical working resulting from heavy expenditure in recent years. Direct exports, mainly tinplate and electrical sheets, again increased both in tonnage and value, and in the current year it is hoped at least to maintain the figure of over £36,000,000 achieved last year.

Record Imports of Ore into UK Last Year

IMPORTS of iron and manganese ore into the UK in 1960 by B.I.S.C. (Ore), Limited, reached a record level, exceeding by 1,417,000 tons the previous highest figure in 1957. They totalled 17,834,000 tons, an increase of 4,721,000 tons over 1959.

Of last year's total, 3,955,000 tons was imported in the first quarter (2,785,000 tons in 1959), 4,319,000 (2,668,000) tons in the second, 5,069,000 (3,755,000) tons in the third, and 4,491,000 (3,905,000) tons in the last quarter.

Effect of Rising Costs on Steelmakers

IT is estimated, says Sir John Green, chairman of Thos. Firth & John Brown, Limited, steelmakers, of Sheffield, in his annual report, that, in the absence of any improvements in manufacturing efficiency, the reduction in selling price, the substantial increases in costs of coal, gas, and electricity, and a prospective wage increase will reduce profit margins of the group by at least £500,000.

SIR JOHN GREEN

Difficulties associated with the manufacture of heavy forgings and castings have increased rather than diminished. Shortage of heavy forging work is world-wide and, consequently, competition is very keen. Until the demand for new ships and heavy capital equipment revives, the heavy side of the group's business will remain unremunerative.

The demand for bars and billets and all forms of rolled products remained high throughout the year to September 30, 1960, and is still good. Business in hardened steel rolls and back up rolls is determined by the demand for flat products, he goes on. Forward orders are satisfactory.

During the past financial year £1,352,160 was spent on new machine tools, completion of a new heat-treatment department for heavy forgings, and on part construction of new shops and installation of a new 4,000-ton press. The estimated cost of various capital schemes on hand is about £3,100,000.

THYSSEN-HUTTE HOLDING

GERMAN steel group August Thyssen-Hütte, AG, of Duisburg, is to strengthen its holding in the steel concern Stahl- und Walzwerk Rasselstein/Andernach, AG, of Neuwied, from 25 per cent. to 50 per cent. The Rasselstein company has a capital of DM. 56,000,000 (about £4,750,000).

By prior agreement with the High Authority of the European Coal and Steel Community, the option to increase the Thyssen holding, which was open only until December 31, 1960, has been taken up before the Authority has given its permission for the move.

Passing Thoughts . . .

MR. BUTLER told us that we could double our standard of living in 25 years. When we have done it we shall be just about where the Americans are now, but the rate at which we go to double our standard in 25 years is only just about as fast as we are going now, and is only half the rate at which Europe as a whole is going; a quarter of the rate at which some parts of Europe, such as Germany, are going; and an even smaller fraction of the rate at which Russia and China are going. In other words when it comes to economic growth and the rate at which we are increasing our standards of living, we are hardly trying.—MR. E. T. SARA, commercial and economic adviser to the United Steel Companies, Limited, speaking to the Sheffield branch of the Incorporated Sales Managers' Association.

MR. E. T. SARA

Beyond exhortations to manufacturers to enter and increase the export trade the Government could make a further valuable contribution by simplifying still more the documentation for exports. . . . To encourage the export trade it should be made as easy as possible to get the orders and execute them.—SIR A. HAROLD BIBBY, *chairman of Martins Bank, Limited.*

No company can operate these days on a basis of "what I can't sell 'em at home, bless the man abroad who takes them off my hands; when we have a good line, let me keep them all for this country." Once you begin to export to a country, or manufacture in it, you inevitably find yourself participating in the economic life of that territory. This is true, whatever you are exporting or making there.—MR. F. P. S. STAMMERS, chairman of Radiation, Limited.

If the limping coal industry can only be made to walk by burdening the steel industry, which has shown its ability to gallop, then the picture begins to cloud.—Yorkshire Post.

We have to keep our eyes on the hundreds of thousands of boys and girls who do not sail straight on from a sixth form in school to university or a college of advanced technology. For these young people, who will be the main body of Britain's industrial forces, the road from school to further education needs the sort of treatment that Mr. Marples has been giving the Great North Road.—SIR DAVID ECCLES, Minister of Education.

My father always used to say: "The coal trade is a most peculiar trade—it is always feast or famine."—Mr. D. L. Dobson, chairman of the Coal Industry Society at the society's monthly luncheon.

The National Coal Board has spent money on television advertising, and as far as I can see it's not going down too well. I don't find the 15-year-old boys eager to go in the pits. And it is a well-paid job these days. The parents do not want their sons to work underground and they are influencing them.—MR. JAMES BRANNAN, Barnsley Youth Employment Officer.

I believe we are masters of our own destiny in the coal industry in our fight to make it prosperous and efficient.—MR. ALFRED ROBENS, *chairman-designate of the National Coal Board, speaking in Scotland.*

In recent years the coal industry has contrived to present a picture not of aggressive salesmanship but of an industry on the defensive, reluctant to consolidate and meet new competition. The prospects for a smaller industry, free from the desperate struggle to get coal out of the ground at any cost . . . are as promising as those for gas. . . . But these prospects will only be realized if the industry accepts realistically its physical limitations as a source of cheap power. Within these, possibilities abound. The surprising thing is that they should still need to be pointed out.—Daily Telegraph.

Abroad we no longer rule; we have something more difficult to do—to influence or guide, which in many ways is a more difficult task than ruling. If we are to do this only the very best is good enough in production and salesmanship, in professional and business standards, in the services and diplomacy, and in all we do overseas.—CHANCELLOR OF THE EXCHEQUER.

New Production Director of North-Western NCB

MR. E. J. KIMMINS, deputy director-general (operations) with the National Coal Board since 1955, has been appointed production director of the North-Western Divisional Coal Board, a position vacated in December by Mr. F. G. Glossop, when he became deputy-chairman of the East Midlands Divisional Coal Board.

Mr. Kimmins, who is 55, was president of the National Association of Colliery Managers from 1955-56. He was appointed manager of Manvers Main Colliery (Yorks) in 1939 and later became agent of that colliery and of Kilnhurst Colliery. In 1948 he became sub-Area production manager of the Rotherham Area of the North-Eastern Divisional Coal Board. In 1948-49 he was president of the Yorkshire branch of the NACM. He was appointed production manager of the Rotherham Area in 1952 and became assistant director-general of production at NCB headquarters in May, 1954.

POWELL DUFFRYN GROUP CHANGES

NUMBER of changes have been made to the boards of the companies in the Powell Duffryn, Limited, group. Mr. W. H. Sharland, deputy chairman of Powell Duffryn, Limited, has joined the board of Gulf Radiators, Limited. Mr. A. C. Hazel, managing director of Hurseal, Limited, has been made a director of Janitor Boilers, Limited, and Mr. K. M. D. Johns, who has joined the group from the Mobil Oil Company, Limited, has been appointed a director of Janitor Boilers, Hurseal, and Gulf Radiators.

Mr. R. H. Stewart, managing director of Janitor Boilers, has joined the board of Hurseal, and the managing director of Powell Duffryn Technical Services, Limited, Mr. R. Turner, who is also deputy chairman of Powell Duffryn Carbon Products, Limited, becomes a director of Janitor Boilers and Gulf Radiators.

Coal Shortage Ahead

NUM CHIEF'S WARNING TO MERCHANTS

"WE have had the position over the past two or three months that the total consumption of coal has been exceeding deep-mined production each week by more than 500,000 tons; over the past four weeks (excluding the holiday week) the gap has been as much as 850,000 tons each week. The deficit has been made good by open-cast and by drawing on stocks, but the latter will not last for ever, and in any case, stocks are limited to the extent of the availability of certain types of coal."

This warning was given by Mr. S. W. G. Ford, president of the National Union of Mineworkers, speaking, on Monday, at the monthly luncheon in London of the Coal Industry Society. It had been suggested, he said, that NUM views as to the future, to the gradual retrenchment, restriction, He agreed that the problems of the industry should be approached with the greatest measure of confidence, but they did not serve the best interests of the industry by ignoring the difficulties with which it was faced or the psychological effect of past events on employees.

Mr. Ford reviewed the "relatively short period" of the past three to four years—from 1956 when there was no output ceiling, thousands of new entrants to swell the 700,000 manpower figure, and the assurance of security for the foreseeable future, to the gradual retrenchment, restriction, and revision of the industry's 1960 programme. "It took this industry—working as it was on the basis of six coal winding days a week and with manpower more or less at its peak since before the last war—the first six hard years of nationalization to increase production by 33,000,000 tons a year; it took precisely half that time to lose ground to the same extent in the field of consumption," he said.

Union's Warning

With not only its duty and responsibility to its members but also the overall national interest in mind the union had warned the Government that unless steps were taken to enable the industry to develop on the basis of reasonable stability it would be impossible for it to play an effective rôle in the economy of the country.

"Surely it is essential that we should make the greatest possible use of the reserves of coal that we have, thus avoiding the development of circumstances in which the economy of the country would become more and more reliant on imported fuel," Mr. Ford declared.

Among the union's proposals was the suggestion that the Government, having assessed the overall fuel requirements of the nation, should provide for coal a share of the national demand for fuel commensurate with the coal industry's position as a valuable national asset and should agree to underwrite a coal production programme based on such estimates.

Mr. Ford warned his audience that it was impossible to adjust the production of coal from year to year to meet fluctuations in demand. Pits could not be closed and re-opened at will. But coal was a national, irreplaceable and priceless asset "which we just cannot afford to sacrifice for some doubtful short-term advantage."

The increase in inland consumption over the year was a little over 4 per cent., but in the latter half of the year the increase was about 8 per cent. and that meant with exports at the current level, a total annual consumption of about 210,000,000 tons—a not insignificant upsurge in inland consumption coming at a time when the industry's production potential had been deliberately and systematically restricted and manpower depleted to a record low level for this century.

"Our production potential is dangerously below what it ought to be if we hope to continue to meet a demand of the order of today's rate of consumption. Unless we do something to bring production more into line with the current rate of consumption, we shall inevitably again reach the point where, as in the early 50s we were unable to satisfy the demands and consumers will be forced to turn to alternative fuels. We cannot afford to ignore the lessons that are there to be learned from our experiences of the past 14 years," Mr. Ford insisted.

He felt the key to the immediate problem was manpower. Serious as was the unsatisfactory level of recruitment, the problem of wastage—deaths, retirements, and men leaving the industry for other employment—was especially disturbing. Even allowing for the effect of the introduction of compulsory retirement, wastage last year was 28 per cent. higher than the average for the previous 10 years. "There has been no single week during the past 12 months in which the industry has recruited more men than have left it," he said.

Improvement in the consumption of coal over the past 12 months, he believed, stemmed from the fact that the industry was just beginning to derive some benefit from the improved techniques which had been introduced not only in production but also coal preparation and utilization and the sales and technical services. "But the benefits that can accrue will be lost unless we can find an answer to the very serious problem of falling manpower."

The first essential was to convince those in the industry and a greater number of young people that the industry could offer security and reasonable conditions of employment. Then some more tangible evidence from the NCB as to its future attitude as "a good employer," was required

Conditions had been improved but the labour market being what it was today the coal-mining industry, if it was to compete with outside industry for a fair share of the available manpower, must offer inducements of the kind which would cancel out, or

compensate for, so far as this was possible, the less attractive features of the job.

"While we as a union have been accused of being too pessimistic it has been suggested that Mr. Alfred Robens is over-optimistic," Mr. Ford concluded. "I am not disturbed by his confidence; I, too, refuse to be pessimistic about the future. There are encouraging signs. The much maligned coal stocks afford a breathing space in which to readjust ourselves but what we want above all else is a period of stability.

Government action along the lines the union had proposed would ensure a long-term perspective for the industry. But they must all—management and men, NCB, NUM, and the distributive trade, create the circumstances and the atmosphere in which they could not only meet the demands made on the industry by consumers, but at the same time provide a steadily improving standard of living for those who were prepared to make this possible.

GEC Soon to Announce Expansion Plans

THE company is aiming to "reform itself on modern lines," and a number of plans for expansion will be announced in the near future, said Mr. Arnold Lindley, newly-appointed chairman of the General Electric Company, Limited, on Tuesday. At present, he said, both the heavy engineering industry, which accounted for 25 per cent. of GEC's business, and light engineering, including domestic appliances, which absorbed the remaining 75 per cent., were in the doldrums, but on the latter side there was scope for development. On the heavy side he was less optimistic; developments were more likely to be in the direction of mechanical engineering than of electrical.

Mr. Lindley said that while no merger negotiations were in progress, the company would consider a merger "if it was appropriate," and would also consider a sharing of manufacture between companies if it involved a rationalization of research and development expenditure.

Improvement in Order-book of Redpath Brown

SIR ELLIS HUNTER, chairman of Redpath, Brown & Company, Limited, structural engineers and steel stockholders, of Edinburgh, states that the volume of orders received during the year 1959-60 showed a marked increase on the previous year's figures. The improvement of the order-book has since continued, and ensures the company's works being heavily engaged for several months. There has recently been some improvement in profit margins, but these are still low having regard to the character of the industry.

Sir Ellis, in his annual statement to shareholders, says that the amount of inquiry for both home and oversea remains high. The sharp increase in volume of home orders placed during the year provides continuity of production and employment, and reflects the success of improvements in the use of structural steel. The competitive position of fabricated steelwork has been strengthened by the availability of sections of increased structural efficiency, and the adoption of higher working stresses. During the year £99,579 had been spent on net additions to plant.

Winget in Merger Talks with Gloucester Railway Carriage

WINGET, LIMITED, manufacturers of concrete mixing machinery, of Rochester (Kent), and the Gloucester Railway Carriage & Wagon Company, Limited, Gloucester, are considering a merger. Net assets of the two companies total £5,000,000. Winget needs more manufacturing capacity to meet the increasing demand for its products, while Gloucester Railway Carriage lacks work for its main business of building rolling stock.

A financial link between the two companies was made last October. An arrangement for a minimum of seven years made Gloucester's surplus capacity available to Winget, and £300,000 was invested by Gloucester in Winget in 6 per cent. convertible loan stock 1967-74.

General Sir William Morgan, chairman of Gloucester Railway Carriage, and Mr. Robert Ducas, chairman of Winget, state that time will be required to examine details and formulate any definite proposals.

HIGHER HALF-YEAR PROFITS BY EDGAR ALLEN

SHEFFIELD steelmakers and engineers, Edgar Allen & Company, Limited, is increasing its interim ordinary dividend for the year ending April 1, 1961, by 1 per cent. to 5 per cent. The directors believe they will recommend a final of 7½ per cent., thus maintaining the total ordinary dividend for the year at 12½ per cent. They add that the unaudited group accounts for the half year ended September 30 show total sales slightly greater than those of the corresponding period in 1959, with pre-tax net profits increased by some 37 per cent.

The more favourable trend in the parent company's business, however, has been felt unevenly in its various manufacturing divisions; in particular its engineering division is still working below capacity. Although recent inquiries, especially from oversea, for capital equipment and plant of the types made by the company (and certain subsidiaries) confirm the opinion that prospects are good, it is apparent that such business now taken will not affect the current year's trading results.

Lodge-Cottrell Export Orders Worth Over £245,000

EXPORT orders valued at over £245,000 have been given to Lodge-Cottrell, Limited, electrical precipitation plant manufacturers, of Birmingham. One, worth £85,000, is to supply the Anglo-American Corporation of South Africa, (Rhodesian Broken Hill Development Company), Limited, with gas cleaning plant for two sinter machines.

The plant consists of two sets of evaporative cooling equipment with pumps, sprays, and valves; two precipitator units of the three-stage horizontal flow type, and HT transformer-rectifier equipment.

In addition, Lodge-Cottrell has secured two contracts through its licensees, Auxeltra Electrification et Travaux Speciaux, SA, (Brussels). These consist of two precipitator units to be erected at Halinogorsk (USSR), valued at £70,570, and two units valued at £90,000, to deal with gases from a pulverized fuel boiler at the Mol Power station, Belgium.

Company News

PEAK IRON OUTPUTS

Colvilles Spends £16,500,000 on New Plant

RECORD output of pig-iron was achieved by Colvilles, Limited, in the financial year ended September 30, 1960. The company produced 963,586 tons of pig-iron, compared with 673,163 tons in the previous year and the outputs of steel ingots and castings, at 2,056,467 (1,442,312) tons, and of coke, at 698,067 (468,132) tons, also showed marked increases. The directors state that new orders are not now coming in so fast, but the orders on hand will keep the plant fully occupied for some months.

The construction of the strip mill development scheme is being well maintained. The expenditure during the year on all schemes totalled £16,614,174, which the company financed from its internal resources. The new billet mill at Hallside works was brought into commission during the year and the modernization of the melting shop at these works is under way. A start has been made on the construction of the 4-high plate mill at Clydebridge steel works. The directors state that the concentration by the engineering staff on development schemes has meant that some of the larger repair jobs have been deferred.

Net profit for the year was £5,285,000, (£4,913,000), after tax of £4,973,000 (£3,677,000). Final dividend of 10 (8) per cent. makes 16 (14) per cent. for the year.

COZENS & SUTCLIFFE (HOLDINGS), LIMITED—A one-for-three rights issue of 653,788 new 4s. ordinary shares, at 10s. 6d. a share, is to be made. Net proceeds of about £315,000 will be used to finance recent and planned developments. The issue is payable not later than January 31.

FLETCHER HOUSTON & COMPANY, LIMITED, iron-founders and engineers, of Tipton (Staffs)—Dividend of 30 (26⅔) per cent. is to be paid for the year ended September 30, 1960, on capital increased by a two-for-one scrip issue. Consolidated profits were £331,127 (£168,317), subject only to tax of £165,827 (£80,189).

BRITISH ANZANI ENGINEERING COMPANY, LIMITED—The company has appreciable inquiries from all over the world and should be able to look forward to a satisfactory year, states the chairman. Group profit, before tax, for the 18 months to August 31, 1960, was £13,845 (£7,811 for the year) and the dividend is 7½ (5) per cent.

HACKBRIDGE HOLDINGS, LIMITED—Interim dividend of 2½ (3¾) per cent. is to be paid on account of the year ending March 31, 1961. The cable-making subsidiary still suffers from the effects of the "unnecessary price war" and transformer manufacturers are now experiencing intensified competition. The group order-book is still substantial and it is hoped the second half of the financial year will reflect a period of greater stability.

ASSOCIATED COMMERCIAL VEHICLES, LIMITED—Prospects for 1961 must be considered promising, subject to there being no major upheaval in the industrial world, states the chairman, Lord Brabazon. Results for the current financial year to date maintain an improvement over last year. Production has responded well to the growing order-book during the year and is on an upward scale, he adds. Referring to the proposal to raise approximately £3,000,000 by a one-for-one rights issue, he points out that it is not possible continually to expand the level of trading without additional permanent capital.

J. & H. B. JACKSON, LIMITED, metal merchants, of Coventry—Despite the cut-back in the motor industry, the chairman, Mr. J. N. Weaver, feels that the outlook is promising. Sales of scrap increased satisfactorily during the year to September 30, 1960. Sales of steel did not reach expectations owing to the shortage of supplies and a delay in the building of a new steel warehouse, which, it is hoped, will be opened within the next three months.

FIRLAND METALS, LIMITED—This subsidiary of Firth Cleveland, Limited, has acquired Quirk, Barton & Burns (St. Helens), Limited, manufacturers of sheet lead, lead pipe, solder, laminated lead, and other products. Primarily the acquisition was made to reinforce R. E. Roberts & Son, Limited, Bolton, another member of the Firth Cleveland group. Mr. R. S. H. Shepard and Mr. J. Search have joined the board of the new company as joint managing directors.

GUEST, KEEN & NETTLEFOLDS, LIMITED—The capital of Holmpress Piles, Limited, concrete piling contractors, of Hull (Yorks), has been acquired for £380,000 cash, from the Northgate Group, Limited. Mr. F. S. Bassett and Mr. G. M. Daintry retire from the Holmpress board which is joined by Mr. H. S. Killick and Mr. P. D. Brown. Mr. A. B. Holmes and Mr. G. W. Roberts remain on the board, Mr. Holmes retiring as managing director, but continuing as consultant.

GEORGE WILSON GAS METERS, LIMITED—In the half-year to September 30, 1960, the group made a profit of approximately £14,000, compared with a loss of £4,500 in the same six months of 1959. Mr. W. D. Wilson, chairman, says that the transformation is due in part to the increase in the selling price of gas meters, but the main factors are substantial savings in factory and administrative overheads brought about by the re-organization of the manufacturing arrangements of the parent and subsidiary, Radiant-Heating, Limited.

MASSEY-FERGUSON, LIMITED—Net income fell in the year ended October, 1960, to $13,153,944 from $21,018,393 previously. Mr. A. A. Thornbrough, president, says that although group sales were 3 per cent. up at $490,413,988 ($475,543,641), earnings were lower as a result of several "special situations." Earnings of the French company were not satisfactory, reflecting another year of unfavourable economic conditions, while there were items which had an impact on the accounts but which in many respects were non-recurring.

New Branch Offices for Holman Group

TRANSFERRED from the Welsh branch, where he was responsible for the Swansea sub-area, Mr. J. C. Holman has been appointed branch manager of Holman Bros., Limited, mining, iron, steel and brass founders, etc., of Camborne (Cornwall), at its new offices and showroom at King Street, Bristol.

MR. J. C. HOLMAN

The new offices will deal with all Holman group products—Holman, Climax, Maxam control equipment, Goodyear pumps, and Dustuctor dust suppression units and will serve an area comprising Gloucestershire (east of the River Severn), Wiltshire, Somerset, Dorset, and Devon. The group now has seven branch offices in Britain.

Technical representatives are: Mr. J. McBride Fletcher, responsible for Holman and Climax products, Mr. L. J. Gulliford, who represents Maxam Power, Limited, and Mr. J. Benny, who will continue to operate from Camborne. Service engineer is Mr. H. Travis.

TUC DELEGATION TO MEET MR. MACMILLAN

MEETING is to take place soon between the Prime Minister and a de'egation from the Trades Union Congress to discuss the problems of fuel and power and, in particular, the future of the coal-mining industry. The National Union of Mineworkers has been agitating for such a meeting ever since its unproductive meeting with the Minister of Power.

The date for the meeting will be fixed as soon as the TUC and NUM have agreed on who should attend. The NUM wants to have the problems of the industry's shortage of manpower and its financial burdens discussed at Cabinet level.

National Disaster Fund Called For

WHERE a flood disaster occurred, or a colliery explosion killed many miners, a fund was launched to relieve suffering, but if one collier was killed underground he received only a wreath. The Rev. D. T. Evans made this point last week at a meeting of Carmarthen Rural Council at which a national disaster fund was called for.

Another speaker said that the unused residues of past disaster funds could be used as a basis for a national fund from which money would be available to meet every catastrophe.

JAPANESE GOVERNMENT has decided to liberalize the import of common steel products from April or May this year.

Mining Qualifications Board

NEXT Mining Qualifications Board examinations for first and second class certificates of competency as managers and undermanagers of mines, will be held on May 16, 17, and 18, at Glasgow, Sunderland, Doncaster, Wigan, Cardiff, and Stoke-on-Trent. Candidates for limited certificates of competency as managers and undermanagers of stratified ironstone mines will attend at the Doncaster centre.

The Mining Legislation examination for mechanical engineer's certificates, electrical engineer's certificates, mechanic's certificates class 1 and electrician's certificates class 1, will be held at the above centres on May 16. Written part of the examination for certificates of qualification as surveyors of mines, will be held at the above centres on May 17, and the oral and practical examination in July, 1961.

Holders of the higher national certificate in mining surveying, or applicants who have passed the intermediate examination of the Royal Institute of Chartered Surveyors, and are, therefore, exempt from the written examination, must submit their applications not later than March 22, 1961.

Intending candidates should apply after February 22 for the necessary forms, stating whether they have previously attended an examination for any of the above certificates. Completed applications should be returned to the secretary and must be received not later than March 22, and addressed to:—The Secretary, Mining Qualifications Board, Ministry of Power, Thames House South, Millbank, London, S.W.1.

Underground Link for West Midlands Collieries

UNDER a scheme to make the pit more efficient and to produce better coal, the coal winding shafts at Wimblebury Colliery, Cannock Chase Area, West Midlands Division, are to be closed. The scheme includes the building of an underground road, to connect Wimblebury with West Cannock No. 5 Colliery, 1¼ miles away. Coal will travel along it in 2½-ton capacity cars.

The raising of Wimblebury coal at West Cannock No. 5 Colliery, will mean that fewer men will be needed on the underground transport system, allowing more to work at the coal face.

Of the 900 men employed at Wimblebury Colliery, only about 180 surface workers will be displaced. All have been told by the National Coal Board that they are assured of alternative work.

Progress of Modernization at Bates Pit

THIRD stage of the 10-year modernization scheme at Bates Pit (Northumberland), has now been completed. Work started in 1953 on the scheme which when completed will enable the undersea coal reserves to be worked to nearly 30,000,000 tons.

A new 1,000-ft. shaft has been completed and 55 per cent. of the mine is now mechanized. Annual output of saleable coal is approaching 500,000 tons and will eventually reach 750,000 tons. Since the start of the modernization programme the number of employees at Bates Pit has risen from 1,000 to 1,600.

In this paper, presented to the North of England Branch of the National Association of Colliery Managers on April 29, 1960, the authors describe the installation and the successful application of hydraulic chocks and Anderton shearers in seams of only 2 ft. 4 in. and 2 ft. 6 in. thick. This was made possible by the use of a low-height conveyor and self-advancing chocks. Following the success of the Anderton shearers a plough was installed in a similar seam. This venture, however, proved unsuccessful and eventually a shearer was installed to overcome the difficulties.

MECHANIZED MINING IN THIN SEAMS

in the Northern Coalfield

by C. HARRISON* and T. E. L. SMITH†

WOODHORN COLLIERY, in No. 3 Area of the Northern (N & C) Divisional Coal Board, was sunk in 1898. The better seams were extracted many years ago and the thickest seams now remaining with any extensive reserves are only 2 ft. 6 in. to 3 ft. thick.

Mechanization had been applied at the colliery for several years, mainly by the Huwood loader in its rope-driven form and of latter years as a hydraulic machine. These had been used with varying degrees of success, but in 1959 it was decided to embark on a more ambitious scheme. In the previous year, a Meco armoured conveyor, the first 5-in. high face conveyor to be manufactured to NCB specification, was tried at the neighbouring Ashington Colliery. Results from this were considered to be so successful that it could be used to mount a shearer upon it. Drawings of the pan were made and were superimposed by the outline of a BJ-D Magnamatic shearer with a 32-in. disc. This gave the machine base to be 3½ in. from the panzer and 6½ in. from the top of the machine to the height cut by the disc. It was considered, at this stage, that there was a possibility of using the shearer in seams of approximately 2 ft. 6 in. thickness.

Gullick, Limited, Wigan (Lancs), was consulted and the company gave assurance that chocks could be supplied to a size to perform the duty demanded. The type of cantilever bar was next considered; all types were investigated, a decision finally being made in favour of the Groetschel bar by Becorit (G.B.), Limited, Nottingham. Reasons for this choice were:—

(*a*) The bar was available in the most suitable size and section. By the use of the joint, it was possible to have a 1¼-m. bar fixed to the chock and the 1-m. bar to extend forward in cantilever. The Groetschel bar is capable of being set through 12 deg. of vertical travel and the wedge setting fixes the metre bar in any position on this travel.

(*b*) Rigid steel joists suffer from bending with the result that timber packing has to be built over the girders to support the roof. Girders have to be taken off and sent out to be straightened.

(*c*) The bars were reasonably easy to handle.

(*d*) Tests showed that the bar was stronger in cantilever than other types.

Accordingly it was decided to proceed with projects for two faces, one in the Plessey, with a seam section of 2 ft. 4 in., and the other in the High Main with a seam section of 2 ft. 8 in. These projects were both approved by the divisional board and the faces were won out. Fig. 1 shows the timbering plan as submitted and later approved by HM Inspectors.

Description of Faces

Y.2 face in the Plessey Seam is 200 yd. long and the seam section has proved to be somewhat variable from 2 ft. 2 in. to 2 ft. 4 in. The floor is fairly soft and it was agreed that the seams could be cut with up to 4 in. of bottom dirt without creating undue cleaning difficulties. The face is a single unit cutting right to left. Two gates are in use, the main gate supported by 10-ft. by 8-ft. arches and the tailgate by 9-ft. by 8-ft. arches.

R.3 face in the High Main Seam is a 165-yd. single unit and the seam section is again somewhat variable due to post rolls, but averages 2 ft. 8 in. The gates are supported as Y.2 face.

The equipment to be installed on Y.2 was:— (1) A 5-in. high Meco armoured conveyor, the gearheads being converted at the colliery from old Meco S.40 gearheads. (2) The face support system, consisting of 196 Gullick walking chocks and their accompanying Groetschel bars (392 at 1¼ m. and 392 at 1 m.). (3) Meco stage loader. (4) Anderton shearer and necessary rope-tensioning gear.

Equipment for R.3 was as above except that the conveyor was shorter and only 162 chocks and their accompanying bars were used.

The Meco conveyor was built up with the intention of using it to transport the chocks from the tailgate down the face. The pans and chain for the armoured conveyor were transported down

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† Manager, Woodhorn Colliery, No. 3 (North Northumberland) Area, Northern (N & C) Divisional Coal Board.

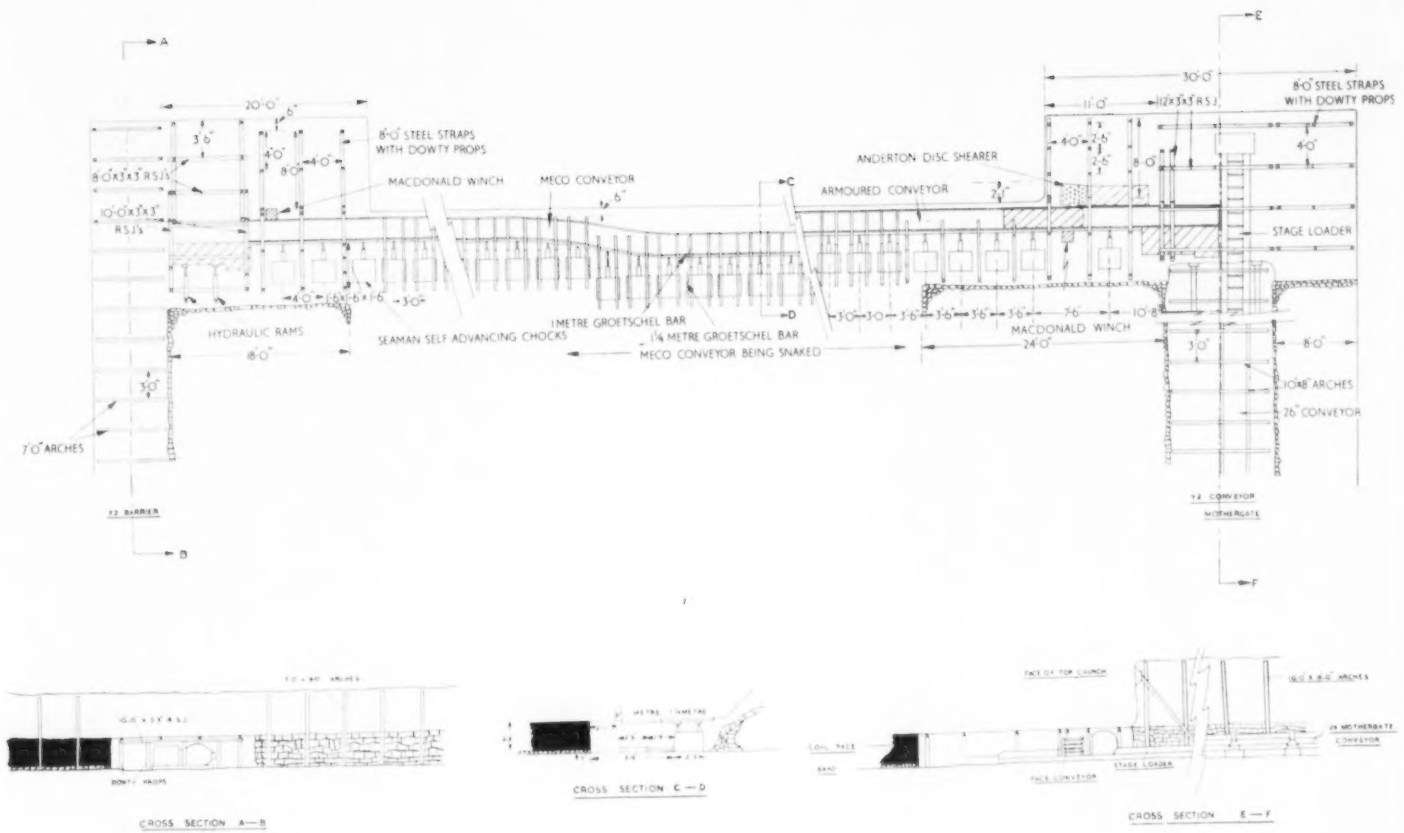


FIG. 1.—METHOD OF ROOF SUPPORT FOR THE ANDERTON SHEARER FACE IN THE PLESSEY SEAM.

FIG. 2.—CONVEYOR SNAKED OVER PRIOR TO HYDRAULIC CHOCKS BEING ADVANCED.

the face on the face belt which had been used for development of the face. The units were assembled from the mothergate drivehead and, on completion, the conveyor was available for transport of the chocks.

The chocks were sent inbye and unloaded at the tailgate ripping lip. It was found possible to put the chock on the conveyor and run it down followed by the canopy, the bars, and the ram. Thus, chocks were run down, assembled, and built up in rapid succession. On subsequent installations it has been found that it is much quicker to install chocks if the rams, hoses, and canopies are fitted on the surface and the chock transported to its position on the face *in toto*.

Installation of conveyor, chocks, and machine, including transport to the site, took 400 shifts at a cost of £1,462.

The shearer is a standard BJ-D Magnamatic 80-h.p. machine fitted with a plough specially designed for the 5-in. high conveyor and a 32-in. disc. Due to the limited height available, it was decided not to use a cable carrier, but to lay the shearer cable and the water hose between the front and back legs of the chocks to the half-way mark on the face. The rest of the cable and hose necessary to work the machine lies in the travelling tracks on the rams.

Deployment of face manpower per shift was as follows:—Shearer operator, one; cable man, one; snaking and grading conveyor, one; chocks, two; stables, four (two at either end), and rippers, six.

Method of Working

The shearer cuts from mothergate to tailgate and ploughs back (Fig. 3). Immediately it leaves the tailgate, the conveyor is snaked over, the man following down behind the shearer snaking and grading the face side of the conveyor. All chocks are numbered and, on reaching the centre chock, the man responsible for the tailgate half of the face starts to draw his chocks, the conveyor mover and the second chock man continue to the mothergate snaking over the conveyor (Fig. 2).

The mothergate stall is prepared for the machine in that all props are removed for the plough to enter the stall. The conveyor mover then commences to grade the goaf side of the conveyor, working towards the tailgate. The second chock man starts to move chocks at the nearest point to the shearer. The shearer man, assisted by the stallmen, then moves over the drivehead and shearer, thus completing the snake. While the shearer man is examining his machine and

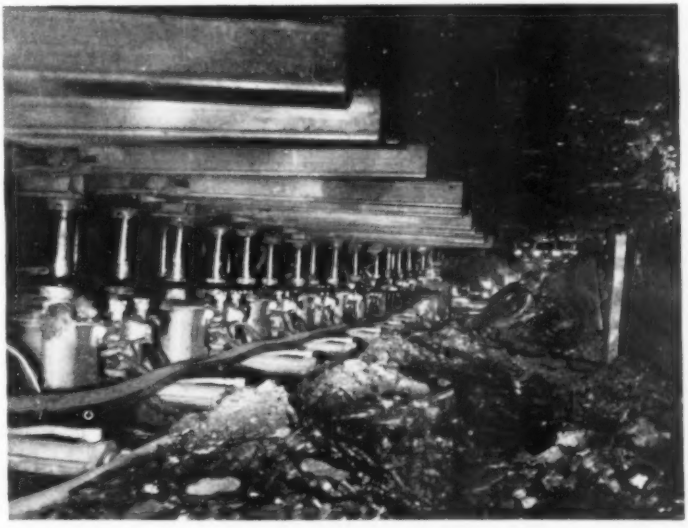
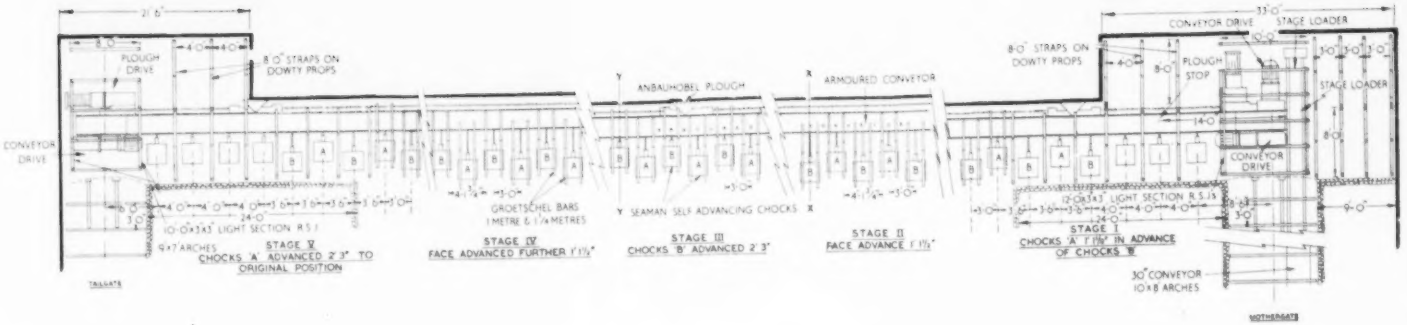
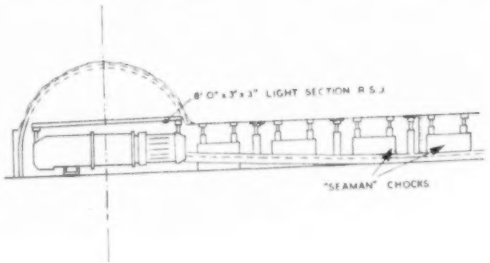


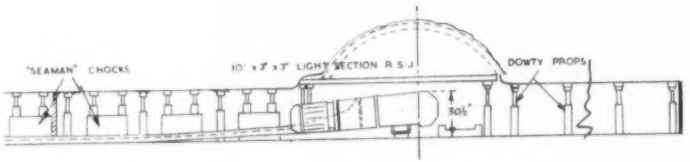
FIG. 3.—ANDERTON SHEARER IN THE PLESSEY SEAM.



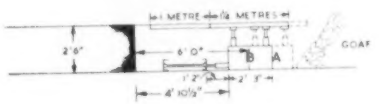
CROSS SECTION OF TAILGATE



CROSS SECTION OF LOADER GATE



CHOCKS DRAWN FORWARD TO FACE - SECTION 'YY'



CHOCKS AT MAXIMUM DISTANCE FROM FACE - SECTION 'XX'

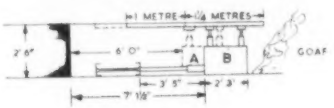


FIG. 4.—SUPPORT PLANS FOR THE ANBAUHOBEL PLOUGH FACE IN THE HIGH MAIN SEAM.

replacing the clearance picks, which are removed for ploughing, the cable man moves over the chocks in the stall area.

The stalls are worked by conventional methods of cutting and hand filling. The main gates are hand stowed and the tailgates slusher packed.

Dust-suppression measures consist of four powerful jets which spray the product as it leaves the disc and also as the face is being cut. Water passes through the motor waterjacket to the sprays, thus permanently keeping the motor cool.

The men moving the chocks forward are provided with short, square-nosed shovels to clean up in front of the chock. It is considered bad policy to permit chocks to be set on soft dirt as the correct loading is not built up until all the soft cushioning dirt is squeezed hard.

Description of the Chock Circuit

Chocks are set at 3-ft. centres, each one having four legs of 2¾ in. dia. and of a variable height to suit the seam section. The chocks on this face have 18-in. legs and their working range is between 2 ft. 2 in. and 2 ft. 10 in. The canopy on the top carries the Groetschel bars.

A circulating pump for the chocks is placed in both gates, each one being powered by a 7½-h.p. motor and pumping a mixture of soluble oil and water at varying pressures controlled by a valve at the pump outlet. The pressure used on the face is approximately 1,500 lb./sq. in. The fluid fed through ¾-in. high-pressure hoses to the chocks and 1-in. return hose feeds back to the 60-gal. tank at the pump.

Each pump serves half the face; thus, there is a circuit of approximately 100 chocks each, the advantage of this being that the pressure is always available to set the chocks. It is found that when two or three chocks are pulling off the same range, movement tends to be sluggish and it is possible to set the chock below the required setting load.

Another factor worthy of note in thin seams is that no spill plates are used. Instead, an angle iron 5-in. by 3-in. is fastened to the goaf side of the conveyor for the attachment of the chock rams. The advantage of this is that the travelling track is less restricted.

To afford maximum protection for the conveyor cable, the cable for the shearer to the half-way mark and the hoses for the chocks, are all passed through the top part of the chocks.

The main haulage rope for the shearer is ¾ in. dia., manufactured from plough steel wire with a tensile strength of 100-110 ton/sq. in. It is of flattened strand Lang lay construction with a wire rope core and is supplied by Glover Bros. (Mossley), Limited. The ends of the main hauling rope are fastened by bulldog clips to a ⅝-in. dia., 6/9 Seale rope, made up in 20-ft. lengths with each end brazed. This arrangement facilitates the installation of the main rope, the short lengths being passed over the pulley of the Macdonald winches at each end of the face.

Rope life is approximately eight to 10 weeks and spare ropes are kept in the district for immediate use and another at the surface.

Rippings

The faces are producing coal on two shifts and it was thus considered wise to also have the rippers on two shifts. This is successfully carried out with the rippers on the back and fore shifts. A steel canopy covers the stage loader to allow coal to flow while rippings are blown.

Operational Results

Both faces started on double-shift working. For the first four weeks the men were assisted in their work by a mechanization team, which showed the machine men and chockers the new type of work.

Results for the four-week period commencing March 21, 1960, are shown in Table 1.

TABLE 1.—*Operation Results on Y.2 and R.3 Faces during the Four-week Period Commencing March 21, 1960.*

Week ended	Output.	Manshifts including shotfirers.	Face (o.m.s., e.p.h.).	Cost per ton.
	Tons.		Tons.	s. d.
Y.2 Face.				
March 26, 1960 ...	1,149	155	7.41	10 8
April 2, 1960 ...	1,943	158	12.3	7 0
April 9, 1960 ...	1,600	155	10.32	7 7
April 16, 1960 ...	1,251	124	10.9	8 0
R.3 Face				
March 26, 1960 ...	1,196	140	8.54	9 4
April 2, 1960 ...	1,309	140	9.35	8 8
April 9, 1960 ...	1,088	158	6.85	11 8
April 16, 1960 ...	1,012	90	11.24	7 4

Chock maintenance costs for three months on Y.2 face was £428 for labour and £43 for material, and on R.3 face £314 for labour and £42 material at a cost/ton of 5.72d. and 5.91d., respectively.

Application of Chocks to the Anbauhobel

Following the successful use of the walking chock with the Anderton shearer, it was proposed to adapt the system to suit an Anbauhobel face, already proposed for the colliery. Fig. 4 shows the support system and the method of working in the High Main Seam.

The chocks are again set at 3-ft. centres, and equipped with cantilever bars as for the shearer face, but in staggered formation instead of in line. The stagger is 13½ in. (half the chock width). To allow for movement of the conveyor when the plough is passing, the front chocks when newly set have 9 in. of the ram exposed. To allow for this, the ram has a 3-ft. stroke instead of the 25-in. stroke of the shearer chocks, thus allowing a 2-ft. 3-in. advance of the face before the chocks are again required to be moved.

Every fifth chock was equipped with a pusher ram which was connected to a separate low-pressure ploughing circuit powered by separate pumps to the high-pressure chock circuits.

The face chosen for this project was J.3 in the High Main Seam. The working section is 3 ft.

including a 2-in. dirt band 9 in. from the roof. The face is 250 yd. long and was opened out and equipped exactly as the previous shearer faces.

Equipment installed is as follows:—(1) 7-in. high Gusto G.20 armoured conveyor with three drives; (2) Westfalia Anbauhobel with two drives; (3) 243 Gullick chocks fitted with Groetschel bars, and (4) Meco stage loader.

Deployment of face manpower per shift was:—Chocks, 4; stalls, 4, and rippers, 6.

Method of Working

Operations started on February 1, 1960, working two shifts per day. The stalls and caunches of the face are worked exactly as for the shearer faces. It was thought that the chockmen would be continually employed in moving chocks, each man being allocated a 60-yd. length. It was soon found, however, that because the top coal would not fall after the passage of the plough, a continuous mining system could not be achieved, because the back chocks could not be moved forward when the ram was fully extended until the top coal had been cut down level with the face. Various methods were tried to achieve this form of hand hewing, shotfiring, and the use of various designs of offset top knives.

When the face was developed, a 2-ft. fault was present 80 yd. from the main gate. Unfortunately, however, after the first week's working, three more faults appeared which were all included in a length of only 60 yd. The faults, although of minor dimensions, caused considerable difficulty with the maintenance of the ploughing horizon and the roof conditions in this area were very difficult. The advance of the face was very slow due to the ploughing difficulties and this did not improve the already difficult roof.

The chock pressure on this face is 1,350 lb./sq. in. and it was found that the pressure required to move over the conveyor for ploughing was a minimum of 600 lb./sq. in. This is considerably higher than the normal ploughing pressure and is due to the resistance of the dead rams and not to the hardness of the coal. The authors are of the opinion that this high pressure on the plough rams increased the problems of ploughing.

After several weeks of working with the staggered system, it was thought that the roof conditions might be improved by adapting a straight-line system. This was done after consultation and approval of HM Inspectors, but did not produce the expected improvement and it was decided to revert to the original stagger system.

After a further four weeks' operations, it was obvious that the top coal would not follow the plough and, due to faulting, ploughing conditions would continue to be difficult; it was decided, after consultation with senior officials, to substitute a shearer for the plough.

In the authors' opinion, to work chocks with ploughs successfully it is necessary to have a condition where the top coal will fall freely after the passage of the plough, otherwise the system becomes cyclic. Also, it would appear that closer spacing of the pusher rams is essential to enable the ploughing pressure to be reduced.

The authors would like to thank Mr. C. Bewick, Area general manager, No. 3 Area, the Northern (N&C) Divisional Coal Board, for permission to present this paper. They would also like to thank HM Inspectors for their ready help and assistance on problems associated with the installations.

All opinions expressed in the paper are those of the authors and are not necessarily those of the National Coal Board.

DISCUSSION

MR. T. HALL, opening the discussion, asked for further details of the Groetschel bars and the maximum width to be supported at any point on the plough face.

The AUTHORS replied that 1½-m. bars were fixed to the chock and the 1-m. bars extended over the conveyor.

MR. W. DAVISON said that in the case of the Plessey Seam, with an average height of 2 ft. 3 in. and an average of 5 in. of cutting in the floor, there would be at least 20 per cent. free dirt and 30 per cent. ash in the untreated smalls. He asked what was the saleable percentage of the product from this face and how it was handled at the surface.

Replying, the AUTHORS said that when the project was considered the seam section was 2 ft. 4 in., but when working a hand-got face, floor cutting was practised to produce a stable floor. Gumflingers were installed on all cutters, but there was still 50 per cent. of the kirvings in the run-of-mine coal. The increase in the dirt of the shearer installation was not as much as it appeared. The product from the Plessey Seam was all washed and the dirt removed; at the washery the saleable product from the face was 65 per cent.

In reply to MR. J. DIX, the AUTHORS said that the lengths of the stalls were 11 yd. and 10 yd. A new type of attachment for the rope-tensioning gear had been produced since the conveyors were installed and with this type of attachment the length of the stall had been increased by 2 yd. in each case. The distance the stalls were kept in front of the conveyor was the absolute minimum. Pulsed-infusion shotfiring was not used, as coal cutting was practised at each end. The total number of caunch men for both gates in two shifts was seven at the main gate (hand packing) and five at the tailgate for the slusher. Two men went in on the foreshift to prepare the caunch and the average advance was about 8 yd./week.

MR. R. NELSON asked for the width of the disc used and the prop-free-front distance from the chock. Since the labour cost of the installation was 70s. per shift, he asked what class of labour was used.

The AUTHORS replied that the disc used was 25 in. wide. The prop-free-front distance from the chock was 6 ft. 9 in. and, even at this distance, travelling was very restricted. The authors said that installation costs included the five-day week bonus.

MR. F. FORD asked if any trouble had been experienced with the Groetschel bars and the wedges providing cantilever support. He also asked for the depth of cover of the seams and noted that, although rope life seem very short, mechanical winches were still being used. He asked if the authors had thought of using a hydraulic tensioning device. He also asked what was the height of the plough in a 3-ft. seam.

Some of the Groetschel bars, replied the AUTHORS, had been bent due to packing them up on the back

side of the chocks to make it easier for the face side of the bar to be set to the roof. No trouble, however, had been experienced with the wedges. The depth of cover in the High Main Seam was 290 ft. and in the Plessey Seam 460 ft. They were not unduly perturbed about the life of the rope and Gullick, Limited, had been approached with regard to a hydraulic tensioning device. On a plough face, the height of the section depended on the height of the chocks and on this face the chocks were designed to operate at 3 ft. The height at which the plough operated was about 2 ft. 8 in.

MR. H. M. HEDLEY asked, with regard to the soft floor, if it was cut to a harder parting and where the seam was wet, if any trouble had been experienced with the conveyors. He also asked if the post rolls occurred in the High Main Seam in the roof or the floor and if they caused any trouble with the shearing disc.

Replying, the AUTHORS said that water could cause considerable difficulty in the Plessey Seam. The rock roof was very strong and, where there was no water, if 5 to 6 in. of the floor was cut it gave a fairly good foundation for the supports. Post rolls occurred in the roof and considerable trouble had been experienced in cutting through them; ordinary flat picks had been found most suitable in these conditions.

MR. J. MAUGHAN asked for the reasons for limiting the advance of the face to two shears per day, since this was less than that obtained by normal cyclic methods. He was also interested to know if the waste was breaking off regularly behind the chock line.

The AUTHORS replied that they had not planned for more than two shears per day, for the men, at that time, were being paid on the day-wage system. In the Plessey Seam with a 200-yd. face, an average of 15 to 16 shears per week should be obtained. In the Plessey Seam, with a roof of medium-strong blue shale, the waste was found to collapse behind the chocks at every cut.

In the High Main Seam, with a sandstone roof, there was never more than 4 ft. of roof on the back of the chocks.

In answer to MR. F. HARRISON, the AUTHORS said the ventilation quantities were 4,000 cu. ft./min. in the Plessey Seam and almost this amount in the High Main Seam.

Clearance Difficulties

MR. J. T. HARDING asked if any clearance difficulties had been experienced with the bottom chain of the 5-in. high conveyor on the soft floor. He also asked what difficulties had been experienced in relation to the shearer itself in traversing the face. With regard to drawing forward the chocks in ploughing, Mr. Harding said that the latest Dowty Roofmaster support system had catered for this by using the same pressure for the conveyor rams as that used for setting the chock. The ram used to hold the plough against the face was on a separate circuit.

The AUTHORS, in reply, said that no chain breakages due to the amount of dirt collected by the bottom chain had occurred. Only one serious delay had occurred due to lack of clearance between the shearer and the roof. With regard to the hydraulic circuit, the difficulty was not in pulling forward the chocks which were coupled to the high-pressure circuit, but the one ram in five coupled to the low-pressure side for ploughing. It had been found necessary to set the pressure on the plough rams so high to move the conveyor over that four rams could not hold the movement of the conveyor during plough operations.

In reply to MR. J. DIX, who asked if any "creep" had occurred on the face conveyor and how it had been overcome, the AUTHORS replied that the Plessey conveyor had moved down the face about 5 ft. and it was necessary to transfer one pan to the top end of the face. The High Main face conveyor had not moved at all. At the plough face, equipped with conventional supports in the High Main Seam, a considerable amount of "creep" had occurred. This had been counteracted by installing a large beam and a series of pulleys to haul the conveyor back up the face.

In answer to MR. W. S. FOSTER, the AUTHORS said the face line was maintained by limiting the stroke on the conveyor ram.

MR. F. HARRISON asked if planned maintenance had been applied to the chocks, and was told that, due to a shortage of mechanics, there was no planned maintenance. It had been found that maintenance required on the chocks of a plough installation was much higher than that required on a shearer face. Maintenance at the shearer face had been negligible, the AUTHORS said.

They thought the difference was partially due to the good face line on the shearer face, whereas on the plough face the rams were in constant movement and it was therefore difficult to maintain a good line of chocks.

EAST MIDLAND DIVISION OF MINES INSPECTORATE

IN connection with the setting up of a fourth inspection district in the East Midland Division of the Mines Inspectorate, it is announced that, with effect from January 1, the boundaries of the North Nottinghamshire and North Lincolnshire District and of the South Nottinghamshire and South Lincolnshire District have been redefined as follow:—

North Nottinghamshire and North Lincolnshire District.—That part of the county of Derby east of the A618 to its junction with the A617 that part of the county of Nottingham east of the A617 to Mansfield and of the A60 to Larch Farm crossroads; that part north of a line drawn due east from Larch Farm crossroads to the county boundary of Nottinghamshire and Lincolnshire; and that part of the county of Lincoln known as Lindsey.

South Nottinghamshire and South Lincolnshire District.—That part of the county of Nottingham south and west of the A617 from the county boundary of Derbyshire to Mansfield, and the A60 to Larch Farm crossroads; that part south of a line drawn due east from Larch Farm crossroads to the county boundary of Nottinghamshire and Lincolnshire; and those parts of the county of Lincoln known as Holland and Kesteven.

The main effect of these adjustments are that Bilsthorpe, Blidworth, Mansfield, Rufford, and Sherwood collieries have come within the purview of the North Nottinghamshire and North Lincolnshire District.

The inspectors-in-charge and the address and telephone numbers of the district offices are unchanged.

WEAR YARD'S PLATE PREPARATION SHOP

OFFICIALS of the company have been responsible for the design and, apart from the foundation work, for the building of a new plate preparation shop which combines simplicity of operation with low capital cost at the Pallion shipyard of Short Bros., Limited, Sunderland. Construction of the shop represents another stage in the modernization of the yard. Much of the material used to equip it was manufactured, or was readily to hand, in the yard itself.

The effect of the development is to enable a foreman and 20 operatives, including two crane drivers, to prepare steel plates, ranging from ¼ in. to 1½ in. in thickness and weighing up to 3¼ tons, at a steady rate of more than 10,000 tons per annum, working a single shift and a 42-hr. week. At present 80 to 85 per cent. of all the shipyard plates go through the shop: eventually a total of more than 90 per cent. will be achieved.

Pallion shipyard is best suited to the building of dry cargo ships of the shelter-deck or ore or bulk-carrier type up to 22,000 tons d.w., although the construction of smaller specialized ships, such as bulk cement carriers, is being considered. The new plate preparation shop and its method of handling the plates were evolved to meet these particular requirements and to provide for a certain amount of riveting if required by the owning companies.

Adjoining the shop is a stockyard 240 ft. by 90 ft., marked off for various sizes of plates, and dominated by an overhead Goliath electro-magnetic crane, which not only unloads railway wagons and stores the steel, but, when the need arises, starts each plate on its journey of preparation, passing it through levelling rolls before it enters the shop proper through one or other of two slots.

Layout and Equipment

The layout and equipment of the shop are of especial interest. A series of inverted castors—more than 800 of them—set on a declivity of ½ in. to the foot in much the same style as launching ways, aided by gravity, carry the plate through the various stages of preparation.

It rolls on the castors into the shop and on to one of two transporters, each of which serves three processing bays. By pneumatic control the transporter can be elevated slightly to make the plate travel along the selected bay.

Rubber and nylon play a part in reducing, where necessary, the shock impact of heavy plates.

At each bed in the process—the marking, the burning and, if riveting is wanted, the drilling and the countersinking—the movement of the plate is arrested by a simple mechanical device foot-operated and foolproof, and stoppers and castors are protected by raising the bed on pneumatic jacks. When the operation is completed the plate is removed by crane to storage racks at the head of the building berths.

Single-head Bantam burners and three nozzle-burning machines serve the bays, and with counter-weighted pulley systems and safety devices these can be handled by one man. Electric wiring and other services are piped through the shop in ducts in the flooring.

Foundations have been laid recently in this shop to carry an 800-ton press, which is to be installed early next year. This press, which will have its own slot from the stockyard, and which will be served by two powered jib cranes, will trough bulkhead plates up to 30 ft. in length, swage light superstructure plates, flange girder plates, and turn mast plates in one complete circle—all in the interests of reducing plating costs still further.

Loans for Sumitomo Metal Developments

SIMULTANEOUS transaction to provide $12,800,000 for Sumitomo Metal Industries, Limited, a private Japanese steel company, has been made by Kidder, Peabody & Company, Inc., and the World Bank. Kidder, Peabody & Company, acting as bankers for the Sumitomo company, privately placed with institutional investors, $5,800,000 of Sumitomo notes. The World Bank made a loan equivalent to $7,000,000 to the Japan Development Bank, which will relend the proceeds to the Sumitomo company. The funds will be used to finance part of the cost of a hot strip and plate mill, a welded pipe mill, and other facilities at Sumitomo's steelworks at Wakayama in central Honshu.

Sumitomo, which is one of the major Japanese steel companies, produces about 6 per cent. of total Japanese output of rolled steel products and is the leading manufacturer of steel pipe and tubes. In the past year Sumitomo's plants accounted for about a quarter of Japan's total output of pipes and tubes.

The company is now engaged in building a modern integrated steel plant at Wakayama in the Kansai district, and a World Bank loan of $33,000,000 made in June, 1958, is helping to finance the construction of a blast furnace and blooming mill at that plant.

The proceeds of current borrowings will be used for the expansion of blooming facilities, the construction of an 80-in. semi-continuous combined hot-strip and plate mill, a medium-sized electric resistance welded pipe mill, and power, water, and transportation services. These facilities are designed to extend the range and quality of the company's welded pipes and to provide it with flat products needed for pipemaking. They will increase the company's annual capacity for pipes and tubes from 398,600 tons to 518,600 tons and for hoop, plate, and strip from 216,000 tons to 600,000 tons.

In this paper, the authors, J. Cadek, T. Myslivec, M. Mandl, J. Vrsek, and J. Fiala, first discuss previous work on the origin of endogeneous and exogeneous inclusions in steel, particularly with regard to radioactive tracer methods, and then describe their own work in this field. Mr. Cadek and Mr. Mandl are at the Research Institute for Ferrous Metallurgy, Prague, and the other authors are on the research staff of the Kl. Gottwald Steelworks, Vitkovice, Ostrava. The article has been translated from Hutnické Listy, 1959, XIV, No. 6, pp. 478-484.

Tracing

NON-METALLIC INCLUSIONS IN STEEL

With Radioactive Calcium

WITH growing demands on the quality of steel the study of the reduction in the quantity of non-metallic inclusions within it has ever greater importance, and this is so both from the aspect of improving the homogeneity and mechanical properties, and also from the point of view of lowering the quantity of defective products which are the result of faults promoted by the presence of inclusions.

Dependent upon their origin, non-metallic inclusions may be divided basically into endogeneous and exogeneous. The first type of inclusions is formed of oxides, sulphides, sulphoxides, nitrides, and additional non-metallic phases arising as a consequence of physical and chemical reactions in the steel. Exogeneous inclusions arise through the corrosive and erosive action of the steel on the casting refractories or other non-metallic material, with which the steel comes into contact during melting and tapping.

Concerning the conditions of the formation of non-metallic inclusions of the first type, there are already hundreds of reports in literature, which explain the effect of the method of conducting the melt, of the slag, of deoxidation, and of other production factors on the quantity and composition of the inclusions in steel. In contrast to this there are relatively few works touching on the problems of the mutual action of the casting refractories and the liquid steel upon each other. This is due to the fact that under practical production conditions the degree of corrosion and erosion of these refractory materials is dependent on a large number of factors, the simultaneous effect of which it is scarcely possible to comprehend. The conditions are extremely favourable for mutual action between the metal and the runner bricks during the casting of steel, since new portions of liquid metal continuously come into contact with the relatively large working surface of the casting runners. The intensity of this mutual action is determined primarily by the chemical composition and temperature of the metal, the pouring rate, the size of the ingot, the ferrostatic pressure of the metal, etc. The wear on the refractory material is dependent primarily on the refractoriness, density, and homogeneity of the structure, and on its ability to withstand rapid changes in temperature. Wear on the refractory casting runners through the action of the liquid steel occurs on the one hand through the action of mechanical erosion, which is promoted by the presence of cracks in the runner bricks, and on the other hand by the direct chemical reaction with the metal, the slag, and the products of deoxidation or secondary oxidation, which are present in the metal.

As a result of cracking and mechanical erosion, exogeneous inclusions pass into the steel; their structure and chemical composition always differs very little from the structure and chemical composition of the materials used for the casting runners, in so far, of course, as they do not come from the jointing mortar. Certain authors[1, 2] have departed from this essential fact, in that they have determined the proportion of exogeneous inclusions on the basis of microscopic investigation of non-metallic inclusions isolated from steel. This method is problematical, especially in the instance where, during deoxidation, inclusions of approximately the same composition as that of the refractory casting runner are formed, and by this method it is impossible to determine reliably the proportion of exogeneous inclusions. Many authors for this reason use other means, and gauge the corrosion of the refractory casting material on the basis of the increase in the cross-section of the casting runners during the tapping period, and according to the external appearance of the runner "sprues." But it is obvious that conclusions concerning the proportion of non-metallic inclusions which are of exogeneous origin are, in this instance, extremely unreliable.

A reliable approach to the study of the problem of the exogeneous inclusions is presented solely by the method of radioactive tracers, which was first used for the study of this problem by Grigoryan

and Samarin[4] in 1954. Later a series of further works[5–10] were published, the aim of which was to make a contribution to the solution of the problem of the origin of inclusions. It is therefore necessary to carry on with further intensive research in the same direction, and namely for two reasons.

The first reason lies in the fact that the relative proportion of non-metallic inclusions is dependent on the conditions of production and tapping of the steel and on the quality of the refractory ceramic materials. From this aspect, therefore, the results of research carried out under the given conditions are an essential prerequisite for the correct determination of the main trend of attempts to improve both the steel production technique, and also the production technique for ceramic refractory material, or for the selection of the most suitable type of this material. It is, of course, self-evident that the results obtained are important for the further penetration of ideas concerning the problem of non-metallic inclusions, which can be based solely on a foundation of reliable, and sufficiently extensive, results of research.

The second reason lies in the fact that the results of individual authors, even though they were obtained during the production of the same steel for ballbearings, are appreciably different. Grigoryan and Samarin[4] in their original work established that about 9 per cent. of the total quantity of non-metallic inclusions originate from the ceramic material of the runner bricks, while about 18 per cent. of the total quantity of inclusions stem from the ladle lining bricks. In a later work Samarin and Kalinnikov[5] found that the lining of the ladle and the tundish are the source of 1.5 to 4.6 per cent. of the total quantity of inclusions present in this same steel, dependent upon the type of ceramic material.

In a further work[6] it is shown that the proportion of non-metallic inclusions formed as a result of corrosion and erosion of the material of the casting tundish, is extremely small by comparison with the total content as determined by the method of electrolytic isolation, and varies within the limits of 0 to 1 per cent., while for all the types of ceramic material investigated it averaged 0.13 per cent. Kagarintseva[7] established that 1.6 per cent. of the non-metallic inclusions pass into ballbearing steels from the ladle lining, and, on the other hand, an even smaller amount from the casting runner. Malinovskii[9] obtained results on the basis of which it is possible to draw the conclusion that secondary oxidation is in essence the cause of inclusions in ballbearing steels. He likewise found that as a result of damage to the ceramic material less than 0.5 per cent. of the total quantity of inclusions is formed, which is a quantity lying within the limits of statistical error of the measurement of the activity. The results of Karachentseva[10] agree with these results.

On the other hand, from a study of extensive literature the almost unanimous opinion follows that with the present state of steel production techniques, during production in the furnace and during teeming, coarse oxide inclusions are formed through the reaction of the steel with the refractory ceramic material, and as a result of the entrainment of slag into the steel. It is generally known that these coarse inclusions are a very frequent cause of scrap.

On the basis of a comparison of the results presented by individual authors, and on the basis of what has been said about coarse non-metallic inclusions, it is necessary to admit that, although the method of radioactive tracers is the only method which affords a basically real possibility of unambiguous determination of the main sources of inclusions, the differences mentioned are explainable only by experimental errors. At the same time, one must consider that the proportions of non-metallic inclusions of exogeneous origin given above are authentic. It is therefore essential to devote appropriate attention to that side of the problem which concerns the experimental method.

One of the most important factors of the whole experimental method, apart from the even distribution of the tracers in the ceramic material, is the isolation of the non-metallic inclusions. In all the works already quoted[4–10], and in some further works based on the method of radioactive tracers, use was made of the isotope Ca^{45}. The choice of this isotope is dictated on the one hand by the suitable half-life of 152 days and on the other by its suitable chemical properties: calcium oxide is not reduced by molten iron, and can easily be used for labelling both refractory ceramic material and also slag. Apart from this it is supposed[5, 9] that calcium oxide added to ceramic substances reacts with them during their firing with formation of aluminium silicates insoluble in dilute acids used for the isolation of the inclusions. Samarin and Kalinnikov[5], for instance, established by petrographic analysis, after dissolution of the carbides, the presence of components in isolated inclusions, which could contain Ca^{45}. Among them are apparent, gypsums, small grains of chamotte, and, in addition, the compounds $2CaO\ MgO\ 2SiO_2$, $CaO\ Fe_2O_3$, and $3CaO\ SiO_2$. On the basis of this they judged that there are no grounds for the opinion that chemical treatment of inclusions before measurement of their activity can have a substantial influence on the results and lead to large errors.

Malinovskii[9] also came to the same conclusion; he devoted special attention to the problem of the losses of radioactive calcium during repeated treatment of non-metallic inclusions with dilute nitric acid. He took specimens from labelled bricks, and after grinding subjected them to repeated treatment in a similar way to that of inclusions after their electrolytic isolation. He found that this treatment has no substantial influence on the specific activity. In the opinion of this author this confirms the hypothesis that calcium oxide is present in the form of complex aluminium silicates. This conclusion is in conflict with the finding of Podolskii[11], who established that, during the treatment of the isolate with dilute nitric acid, a considerable proportion of the radioactive calcium passes into the solution, which was further con-

firmed by the result of similar treatment of active calcium oxide and metasilicate.

But losses of the radioactive calcium may occur even during the electrolytic isolation of inclusions. Gruzin[12], for instance, draws attention to this uncertainty. Shapiro[13], in fact, showed experimentally the passage of radioactive calcium into the electrolyte. On the other hand, Podolskii[11] did not find any activity in the electrolyte.

It is therefore expedient, on the one hand to investigate the activity of the electrolyte in all further solutions which are used for the isolation and eventual further treatment of inclusions, and on the other hand to employ so far as possible different methods of isolation of the inclusions in parallel. In addition, it is necessary to control with extreme care the evenness of the distribution of the radioactive substance in the ceramic material.

Calcium is normally introduced into the ceramic substance in the form of its chloride. In view of the danger that the sodium chloride will migrate to the surface of the bricks during firing[14, 15], it is necessary to precipitate the calcium in the form of the oxalate. At the same time, it must be taken into consideration that after this precipitation it is scarcely possible to expect any further homogenization. Therefore, it is necessary to conduct the precipitation only at the moment when the most thorough possible distribution of the calcium chloride in the ceramic substance is obtained. In every instance very precise control of the evenness of the distribution of the activity in the bricks after their firing is essential.

Another important problem of the experimental method is the choice of the specific activity of the ceramic material.

In literature there are data concerning the lower limits of the activity which it is possible to determine by means of a Geiger-Müller tube. Ricler[16] shows that this limit is 2-3 impulses/min. Bresler[17] is of the opinion that a satisfactory activity for measurement is about 10 impulses/min. Bochkaryov[18] maintains this limit to be 18 impulses/min. Samarin and Kalinnikov[5] used 150 mc. of the isotope Ca^{45} per ton of dry material, at which the activities of the inclusions measured by them attained 20 impulses/min. On the basis of these results it may be judged that an addition of 150 mc. radioactive calcium per ton of ceramic substance is fully sufficient.

Method of Conducting the Experiment and its Results

For the measurement of the activity of the labelled refractory material of the inclusions and the slag, use was made of a Tesla BM 353 nuclear counter and a type XA1 Geiger-Müller tube of British manufacture, with a mica front window of 28.5 mm. dia. and a density of 7 mg./cm.^{2}. The tube was placed in a massive lead shield on a " stand " with the umaplex.

For measurement, the specimen in the form of a fine powder was evenly distributed in an aluminium cuvette of 22 mm. dia. and an area of 3.8 cm.^{2} at a distance of 13 mm. from the window. The ratio of the surface of the cuvette to the area of the window therefore amounted to 1:1.8. The geometric conditions were constant for all the measurements.

The greatest care was devoted to the preparation of the specimen and its even distribution in the cuvette. Both specimens of the ceramic material, and also the isolated inclusions and specimens of the slag, were ground in an agate mortar into a fine powder, which was evenly distributed over the whole surface of the cuvette by means of a camel-hair pencil brush and gentle tapping. Then the weight of the specimen to be measured for activity was determined by normal methods.

In view of the small quantity of the inclusions which it is possible to obtain by isolation within an acceptable period, it was necessary to use the thin layer method for the measurement of the activity. An absorption curve (Fig. 1) was constructed with the use of about 50 g. of a specimen of the labelled ceramic material, taken from the top cross-section

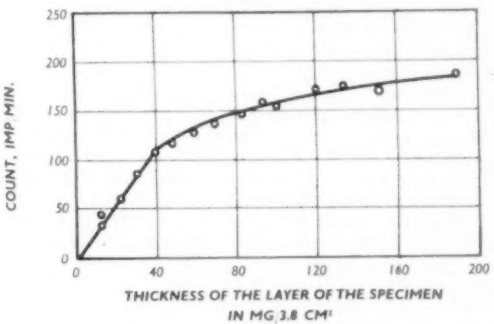


FIG. 1.—ABSORPTION CURVE OF Ca^{45} IN THE CHAMOTTE MATERIAL.

of a runner brick and prepared in accordance with the method described above. From Fig. 1 it is evident that the individual experimental points, from which the absorption curve was built up, have relatively little scatter; from this it may be judged that in the given specimen the activity was sufficiently evenly distributed. The value of the specific activity was determined from the rectilinear part of the absorption curve, *i.e.*, on the assumption that there is negligible self absorption. This value, which amounts to 2,573 impulses/min./gram, was used as the standard value, with which the specific activity of the inclusions and of the slag was then compared.

It is self-evident that the results of the measured activity were corrected for background radiation. Measurement of the activity of the inclusions normally lasted for 120-180 min., as this period was fixed on the basis of the requirement that the mean statistical error should not exceed ± 2 per cent., but in unusual conditions it lasted even longer. The background radiation of the tube was measured before counting and after the completion of each measurement. Apart from this every measurement

was interrupted after 60-90 min., in order likewise to establish the background radiation. In addition, the measured results were corrected for radioactive decay. During the course of the measurement of the specimens from time to time the reproducibility of the measurements was verified. In all instances the results were within the given limits of the extent of the statistical error.

In view of the small quantity of inclusions obtained by isolation, in the great majority of instances the entire quantity obtained, which varied around 5 mg. dependent upon the method of isolation employed, and in no instance exceeded 20 mg., was used for the measurements.

The labelling of the refractory ceramic material was carried out with the radioactive isotope of calcium, Ca^{45}, in a quantity of 50 mc. The isotope was added partly in the form of oxide, partly in the form of the element. By dissolving the calcium oxide and metallic calcium in an excess of hydrochloric acid a solution of calcium chloride was obtained, which was used for the labelling.

The ceramic material for the casting runners was produced in the ceramic department at the Vitkovice Steelworks. In a rotating mixer about 600 kg. of chamotte material were prepared from the currently used raw materials, namely:—(*a*) ZP IIIB chamotte material with a 0-2 mm. particle size range; (*b*) Z II Moravian clay, with a particle size of less than 1 mm.; (*c*) Vidnavsk kaolin. The properties of these raw materials corresponded to the relevant standards CSN 726103 and 726102. After previous mixing of the raw materials in the rotary mixer in the proportions of four parts ZP IIIB chamotte, three parts Z II Moravian clay, and 159 kg. Vidnavsk kaolin and after appropriate wetting, in as dilute a form as possible the radioactive isotope Ca^{45} was added in the form of calcium chloride.

In order to obtain equal distribution of the radioactive isotope throughout the whole volume of the ceramic substance, the total time of mixing was extended to 20 to 25 min. The precipitation of the radioactive calcium with a 2 per cent. solution of ammonium oxalate was carried out after thorough mixing of the mixture, *i.e.*, about 5 min. before the completion of the mixing. The mixture prepared in this way was conveyed to the moulding shop of the refractories department. Here again, to ensure the even distribution of the radioactive calcium, the mixture was several times passed through the homogenizer, and specimens were taken at the same time. Measurement of the activities of the specimens taken confirmed that the isotope was evenly distributed in the ceramic substance. Semi-finished products lubricated with oil were shaped in a manually operated Giebeler press. By this method the rosette bricks and appropriate casting runners were produced.

The labelled pressings were dried at normal temperature for five days. The runners were fired under normal production conditions in an annular kiln in a separate compartment at 1,340 deg. C. The firing time was the same as for normal runners, namely, 9 hr. This period was preceded by drying in the kiln at up to 800 deg. C. for a period of 24 hr. After firing, cooling in the kiln from the firing temperature followed over a period of about 88 hr. The homogeneity of the distribution of the radioactive isotope Ca^{45} was determined by radiometric measurements of specimens take in steps from the interior towards the external surface of the runner (Table 1).

TABLE 1.—*Activity at Various Points of Chamotte Bricks*

Marking of specimens.	Activity of radiation, imp/min/g.	Point at which specimen taken.
No. 1	2,550	Internal surface of runner.
No. 2	2,596	Internal surface of runner.
No. 3	2,630	Between the internal and external surfaces of runner.
No. 4	2,644	External surface of runner.

For the investigation of the corrosion and erosion of the labelled ceramic casting runners carbon steel was chosen, and this, for the reason that on the surface of ingots of this steel so-called "sand" often appears, the origin of which has been judged on the one hand to be products of the fracture of the refractory material, and on the other hand deoxidation products. The shape of the ingots may be seen from Figs. 2 and 3. The chemical composition of melt No. 7900 was 0.41 per cent. C, 0.77 per cent. Mn, 0.30 per cent. Si, 0.028 per cent. P, 0.022 per cent. S, 0.10 per cent. Cr.

Deoxidation of this 75-metric ton melt was carried out with 100 kg. FeSi, 350 kg. SiMn, 50 kg. CaSi, and 2 kg. Al. The melt was cast into 365 kg. bottle-top ingots, placed 18 at a

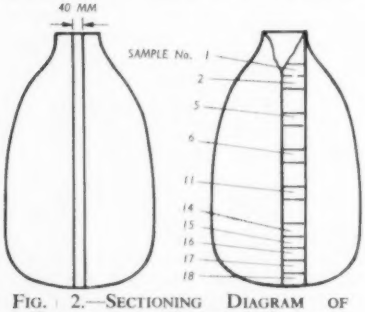


FIG. 2.—SECTIONING DIAGRAM OF EXPERIMENTAL INGOTS 1, 2, AND 3 FROM BOTTOM PLATE NO. 7, SHOWING LOCATION OF SAMPLES FOR MICROCHEMICAL ANALYSIS OF THE INCLUSIONS.

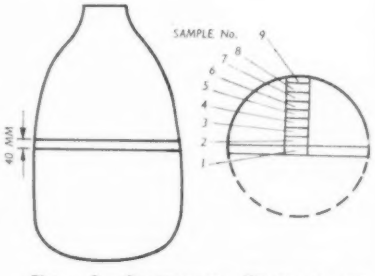


FIG. 3.—SECTIONING DIAGRAM OF EXPERIMENTAL INGOTS 7, 8, AND 9 FROM BOTTOM PLATE NO. 6, SHOWING LOCATION OF SAMPLES FOR MICROCHEMICAL ANALYSIS OF THE INCLUSIONS.

TABLE 2.—*Activity of Slag Forming During Teeming and Activity of the "Sand" Adhering to the Surface of the Ingot.*

Specimen.	Activity, imp/min/g.	Proportion from casting runners, per cent.
Slag	2.171*	84.5
Sand	1.506	58.5

* Average value from three specimens.

time on eight bottom plates. The casting temperature measured on each bottom plate by means of a Pyropto pyrometer was 1,480 deg. C. without correction. Two bottom plates, Nos. 6 and 7, as distinct from the remainder, were placed on special ingot transfer cars and were lined with labelled ceramic casting runners. The relevant teeming rates were 2 min. 30 sec., or in some instances 2 min. 40 sec. The lining of these bottom plates was carried out on transfer cars, so that it would be possible to maintain health safety measures, both during their lining, and also during their dismantling. During the course of teeming the slag forming on the surface of the metal rising in the ingot mould was frozen on to iron rods and preserved for later measurement of the activity, the results of which are given in Table 2. Likewise also the "sand," which had adhered to the surface of some of the ingots coming from the experimental bottom plates, was carefully collected. The results of the measurement of its activity are likewise shown in Table 2.

TABLE 3.—*Total Content of Inclusions in the Trial Ingots.*

Marking of specimen.	Method used for isolation of the non-metallic inclusions.		
	Dickenson.	Direct chlorination.	Electrolytic.
	Total content of inclusions, per cent.		
7/1	0.0076	0.0207	0.0157
7/2	0.0048	0.0154	0.0280
7/3	0.0062	0.0190	0.0143
7/4	0.0066	0.0202	0.0126
7/5	0.0073	0.0245	0.0150
7/6	0.0089	0.0269	0.0510
7/7	0.0086	0.0253	0.0276
7/8	0.0087	0.0238	0.0435
7/9	0.0088	0.0210	
8/1	0.0067	0.0181	0.0180
8/2	0.0065	0.0157	0.0080
8/3	0.0064	0.0192	Not determined
8/4	0.0072	0.0206	0.0260
8/5	0.0084	0.0241	0.0304
8/6	0.0084	0.0160	0.0253
8/7	0.0059	0.0215	0.0145
8/8	0.0094	0.0249	0.0276
9/1	0.0101	0.0279	0.0281
9/2	0.0064	0.0187	0.0366
9/3	0.0059	0.0174	0.0518
9/4	0.0061	0.0200	0.0191
9/5	0.0061	0.0132	0.0192
9/6	0.0072	0.0214	0.0127
9/7	0.0076	0.0235	0.0425
9/8	0.0100	0.0261	0.0182
9/9	0.0069	0.0194	—
1/1	0.0066	0.0261	
1/5	0.0078	0.0213	Not determined
1/14	0.0065	0.0174	
1/17	0.0067	0.0237	
2/1	0.0062	0.0194	
2/5	0.0068	0.0159	Not determined
2/14	0.0050	0.0247	
2/17	0.0072	0.0205	
3/1	0.0043	0.0188	
3/5	0.0058	0.0216	Not determined
3/14	0.0040	0.0254	
3/17	0.0070	0.0239	

The experimental ingots were chosen in such a way that all the characteristic positions of ingots on the bottom plate (Figs. 4 and 5) were represented, *i.e.*, three ingots were taken from each bottom plate. After they had been soft annealed, these ingots were cut in the following manner:— From ingots Nos. 1, 2, and 3, coming from bottom plate No. 7 (Fig. 4), 30-mm. thick plates were cut in the longitudinal direction from the centre of the ingots (Fig. 2), while from ingots 7, 8, and 9, coming from bottom plate No. 6 (Fig. 5), plates of the same thickness were cut out in the transverse direction (Fig. 3). From the plates which were cut out, specimens were prepared for isolation of the inclusions forming in individual areas of the ingots, the total quantities of which are shown in Table 3, as determined by the following methods:— Electrolytic isolation[19, 20], direct chlorination[21], and the method of Dickenson[22].

The procedure described for taking the specimens made it possible to establish the proportion of non-metallic inclusions forming through rupture of the casting runners in the individual main cross sections of the ingots (Tables 4 and 5).

Analysis of the Results

A general explanation of the influence of the chemical composition of the steel on the corrosion and erosion of acid refractory material may be given by Körber-Oelsen diagrams[23] showing the relationship between the level of the equilibrium "silicon" isotherm and the presence of various components in the equilibrium system of metals with dissolved manganese, silicon, and oxygen — the silicate FeO-MnO-SiO_2 saturated with silica (Fig. 6). According to these diagrams, steels whose chemical compositions lie below

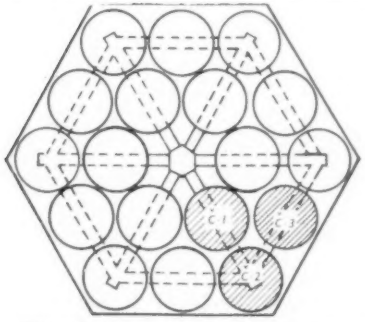


FIG. 4.—LOCATION OF EXPERIMENTAL INGOTS ON BOTTOM PLATE NO. 7.

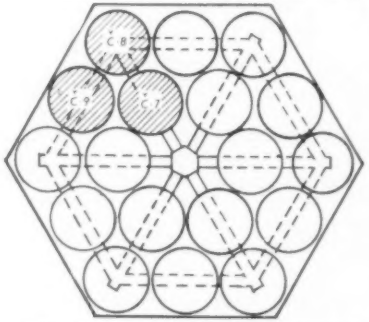


FIG. 5.—LOCATION OF EXPERIMENTAL INGOTS ON BOTTOM PLATE NO. 6.

TABLE 4.—*Proportion of Exogeneous Non-metallic Inclusions, forming through Corrosion and Erosion of the Chamotte Casting Runners. Ingots Nos. 7, 8, and 9 (Fig. 5).*

Marking of specimen.	Method used for isolation of the non-metallic inclusions.					
	Dickenson.		Electrolytic.		Direct chlorination.	
	Activity, imp/min. g.	Proportion, per cent.	Activity, imp/min. g.	Proportion, per cent.	Activity, imp/min. g.	Proportion, per cent.
7/1	—	—	0	0	540	20.98
7/2	140	5.44	80	3.11	359	13.90
7/3	294	11.40	145	5.64	345	13.38
7/4	246	9.56	145	5.64	181	7.04
7/5	400	15.53	0	0	382	14.83
7/6	636	24.72	142	5.62	345	13.38
7/7	565	21.9	168	6.54	161	6.27
7/8	415	16.12	144	5.63	—	—
7/9	555	21.54	—	—	520	20.10
Average for ingot No. 7	—	15.77	—	5.36	—	13.73
8/0	—	—	—	—	—	—
8/1	224	8.7	208	8.10	324	12.58
8/2	653	25.4	250	9.73	605	23.50
8/3	250	9.72	218	8.48	563	21.87
8/4	548	21.28	0	0	550	21.36
8/5	342	13.30	240	9.34	321	12.45
8/6	574	22.28	0	0	521	20.20
8/7	367	14.25	200	7.78	262	10.18
8/8	172	6.68	93	3.61	—	—
8/9	—	—	—	—	509	19.60
Average for ingot No. 8	—	15.20	—	7.84	—	17.82
9/0	—	—	—	—	—	—
9/1	232	9.03	143	5.56	375	14.58
9/2	417	16.20	179	6.95	520	20.10
9/3	298	11.64	52	2.10	670	26.00
9/4	183	7.12	351	13.63	333	12.94
9/5	416	16.18	196	7.60	505	19.62
9/6	301	11.68	339	13.11	590	22.90
9/7	376	14.61	171	5.65	346	13.36
9/8	461	17.92	137	5.33	—	—
9/9	218	8.48	—	—	678	26.40
Average for Ingot No. 9	—	12.54	—	7.49	—	19.49

TABLE 5.—*Proportion of Exogeneous Non-metallic Inclusions, forming through Corrosion and Erosion of the Chamotte Casting Runners. Ingots Nos. 1, 2, and 3 (Fig. 4).*

Marking of specimen.	Method used for isolation of the non-metallic inclusions.			
	Dickenson.		Direct chlorination.	
	Activity, imp/min.g.	Proportion, per cent.	Activity, imp/min.g.	Proportion, per cent.
1/1	550	21.35	432	16.74
1/2	262	10.32	510	19.80
1/5	548	21.30	497	19.31
1/8	785	30.51	315	12.24
1/11	396	15.40	421	16.38
1/14	674	26.18	720	27.95
1/15	426	16.54	670	26.04
1/16	485	18.85	299	11.60
1/17	300	11.65	501	19.45
1/18	354	13.78	417	16.20
Average for ingot No. 1		15.58		18.57
2/1	790	30.70	530	20.61
2/2	640	24.86	360	13.96
2/5	740	28.80	617	24.00
2/8	215	8.36	568	22.20
2/11	530	20.59	312	12.20
2/14	378	14.67	437	17.36
2/15	509	19.75	622	24.18
2/16	290	11.26	197	7.66
2/17	259	10.08	384	14.92
2/18	401	15.60	450	17.47
Average for ingot No. 2		18.46		17.45
3/1	511	19.84	602	23.40
3/2	562	21.83	414	16.20
3/5	374	14.53	505	19.61
3/8	602	23.40	584	22.68
3/11	397	15.42	421	16.35
3/14	425	16.50	388	15.07
3/15	214	8.33	296	11.50
3/16	338	13.12	299	11.62
3/17	451	17.50	460	17.86
3/18	420	16.31	384	14.93
Average for ingot No. 3		16.67		16.92

the indicated silicon isothermal curve, will continue to corrode acid refractory material, so long as the silicon content of the steel does not reach a value corresponding to a given concentration of manganese for a given temperature. In other words, the corrosion of acid refractory material will be correspondingly less, the closer the silicon content approaches to the value corresponding to the isotherm for a given manganese content.

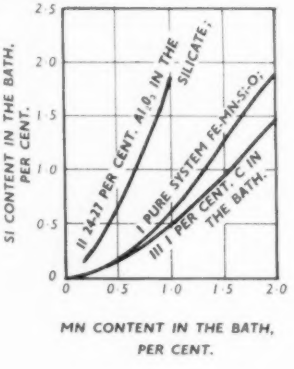


FIG. 6.—INFLUENCE OF ALUMINA AND CARBON ON THE DISPLACEMENT OF THE SILICON EQUILIBRIUM ISOTHERMS.

Great importance for the reaction of the refractory ceramic material with the molten steel attaches to the displacement of the silicon isothermal curve in the upward direction through additions of Al_2O_3 (Fig. 6) and its displacement in the reverse direction with the increase in the carbon content of the steel. From a comparison of curves 1 and 2 (Fig. 6) it follows that in the presence of Al_2O_3 in the ceramic material, corrosion of the latter by the steel takes place on a greater scale than the corrosion of purely acid materials. The corrosive action will further increase with a rising concentration of manganese and a falling concentration of silicon in the steel. From the displacement of curve 2 as opposed to curve 1 it follows that this corrosive action will be all the weaker, the greater is the carbon content of the steel.

It is understandable that at high Al_2O_3 contents in the ceramic materials this corrosion will again be radically less, since it will be a matter of a high melting point alumino-silicic compound. During the casting of steel with chamotte runners the mechanism of erosion and corrosion is, of course, more complicated.

When contact takes place between the ceramic casting material and the liquid steel, a plastic intermediate layer is formed on the contact surface.

Through the action of the deoxidation products and components, which may be suspended, emulsified or merely dissolved in the steel, this layer becomes enriched in these components. If, at the same time, liquid alumino-silicates are formed, the stream of steel entrains them, so that the cross-section of the runner is thus increased. If the products of this reaction are viscose, they continue to adhere to the surface of the runner and form a protective skin. During the teeming of the steel two processes therefore affect the casting runners, namely "absorption" of deoxidation products by the casting runners, and the simultaneous break-up and entrainment by the stream of steel of the intermediate layer resulting from the reaction. The first of these processes, which is a refining process, is promoted by capillary forces, the ferrostatic pressure of the steel, and the greater porosity and higher melting temperatures of individual components of the casting runners.

The content of aluminium oxide in the ceramic material used in this work varied within the limits of 35-38 per cent. In accordance with the diagram in Fig. 6, for a given chemical composition it is possible to assess the aggressive action of the molten steel on this material. In reality, the proportions of non-metallic inclusions formed as a result of the corrosion and erosion of casting runners produced from this material are fairly considerable; they vary within the limits from 12 to 19 per cent. of the total content of the inclusions. By comparison with the results quoted from literature sources[6, 7, 9] these proportions are considerably higher.

These discrepancies, which in certain instances are as much as 100 times greater, are not explained by the lower quality of the chamotte runners used in this work, but primarily by the different method of isolation of the non-metallic inclusions. As is evident from Table 4, in the inclusions isolated by the electrolytic method the proportion of exogeneous inclusions from the labelled chamotte casting runners is in almost all instances radically lower than in the inclusions isolated by the method of Dickenson or by direct chlorination, which is evidence of the dissolution of the radioactive calcium Ca^{45} during the course of electrolytic isolation. In certain instances the non-metallic inclusions isolated by the electrolytic method had practically zero activity, whereas the activity of the inclusions isolated from the same specimens by the method of Dickenson or by the direct chlorination method corresponded to the considerable proportion of exogeneous inclusions from the chamotte casting runners. This finding explains not only the low proportions of exogeneous inclusions from the chamotte casting runners which were established in earlier works,[6, 7, 9] but also the disagreement between the results of the individual authors.

For isolation of the non-metallic inclusions these authors used the Fitterer-Duvan electrolytic method, during which conditions for the dissolution of the radioactive calcium are still more favourable than during the use of the Klinger-Koch method. From a comparison of the results of the measurement of the activity of the non-metallic inclusions isolated by the methods mentioned, it follows that the electrolytic method of isolation of the inclusions is unsuitable for the given purpose, since it produces lower results, which are not reproducible.

The presence of activity from the chamotte runners in the slag rising to the surface of the ingots during teeming confirms that a considerable proportion (84.5 per cent.) of the products of corrosion and erosion can rise during teeming to the surface of the melt. From the results of measurement of the activity of the "sand" it follows that its origin is predominately exogeneous, since 58.5 per cent. of it originates from the casting runners. It was established by X-ray analysis that the particles of "sand" represent high melting point components enriched with aluminium oxide, which escape with great difficulty from the steel, and are very slow to react with the slag floating to the surface. Under the influence of their physical and chemical properties they are retained on the surface of the ingot. The distribution of the non-metallic inclusions originating from the chamotte casting runners in the volume of the ingot is completely fortuitous, which agrees with the results of other authors.

If the literature data[6, 7, 9] were completely unambiguous and reliable, it would be scarcely justifiable to endeavour to improve the quality of the ceramic material in the light of demands for an increase in the micro-purity, for the reason that it would be possible to consider the published proportions of inclusions originating from the casting system as inconsiderable. But it follows from the present work that these proportions can be considerable.

In order to be able to judge, however, what importance attaches to attempts to improve the quality of the ceramic material for the attainment of higher micro-purity, it is necessary to establish whether the quantity of exogeneous inclusions is determined by the quality of the ceramic material, or the physical and chemical properties of the steel and of the products of the reaction between the steel and the ceramic material. This may most readily be carried out by a comparison of the influence of various refractory materials on the proportion of exogeneous inclusions. Progress in this direction will be made in research in the coming years.

Conclusions

In this work a description is given of the first investigation and study of the origin of non-metallic inclusions in steel by means of the radioactive isotope of calcium Ca^{45} which has been carried out in the Czechoslovak Republic. It showed that:—

(1) On average, 12-19 per cent. of the total quantity of non-metallic inclusions originate from corrosion and erosion of chamotte casting runners.

(2) The results obtained are radically higher than the results presented in literature. This discrepancy is explained by the unsuitability of the methods of isolation of the non-metallic inclusions used in

works previously published, which were based on the use of the isotope Ca^{45}.

(3) In order to be able to draw a reliable conclusion concerning the quality of the ceramic material under investigation, with a view to obtaining the highest micro-purity, it is necessary to carry out further experiments with other types of ceramic material. Comparison of the results of these future experiments will make it possible to determine whether the quantity of exogeneous inclusions is fixed by the quality of the refractory material, or by other factors, such as the physical and chemical properties of the steel, the products of corrosion and erosion, etc.

(4) It is shown that the Klinger-Koch method of electrolytic isolation is unsuitable for the isolation of inclusions originating from material labelled with Ca^{45}. Even more unsuitable is the Fitterer-Duvan method, which has in practice been used in all the published works carried out by means of the isotope Ca^{45}. The Dickenson method produces practically the same results as the method of direct chlorination.

Acknowledgments

The authors feel it their duty to thank their collaborators, M. Lubovsky, J. Vandas, M. Mensikov, and others, from the steelworks and refractories department at the Klement Gottwald steelworks in Vitkovice for technical assistance during the experiments. They also thank the chief health specialist, Dr. F. Pachner, for his interest in the experiments and for help in solving various health safety precautions.

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Engineers to Discuss Rolling Mills

ENGINEERING aspects of rolling mills will be the subject of the 42nd meeting of the Iron and Steel Institute's Engineers' Group on March 1 and 2.

Mr. F. B. George (Consett Iron Company, Limited) will be in the chair at the meeting, which will be held at 4, Grosvenor Gardens, London, S.W.1.

The meeting will start on the afternoon of March 1 with the presentation of a paper by A. P. Clark and R. Kenderdine (Dorman Long (Steel), Limited) devoted to mechanical and electrical features of the Lackenby beam mill. After the presentation of the paper, there will be a discussion on the mechanical aspects of this modern mill, which incorporates in its design many interesting engineering developments. The discussion on this paper will continue on the following morning, when attention will be given to the electrical features of the mill.

The emphasis on electrical engineering will be continued at the afternoon session, at which a paper by H. D. Morgan (Steel Company of Wales, Limited) and W. Spence (Associated Electrical Industries, Limited) on the development of electric drives and control for high-speed cold-reduction mills will be presented and discussed.

Calcium Carbide Industry for New Zealand?

POSSIBILITY of establishing a calcium carbide industry, using the South Island limestone deposits, is being studied by the New Zealand Government, which is prepared to grant power concessions to any private group interested.

An important new industry will shortly be established in New Zealand under a joint agreement by ICIANZ, Limited, and Yorkshire Imperial Metals, Limited, Leeds. The new industry will manufacture copper and copper alloy sheet, strip, and tube. Capital of over £NZ2,000,000 will be required, and it is expected that an ICIANZ subsidiary company will be formed in New Zealand to conduct manufacturing operations. The plant is likely to be in the Auckland area, and production is expected to commence in about 18 months. ICI, which is an equal partner in Yorkshire Imperial Metals with Yorkshire Copper Works, Limited, is the largest producer of wrought non-ferrous metals in the British Commonwealth.

A STEEL ROLLING MILL, to roll imported ingots into bars and sections, originally destined for Nairobi, will now probably be constructed at Jinja, Uganda, according to the main sponsor of the project, Jayant Madhvani. This is believed to be due to its proximity to the Owen Falls, which would provide cheap energy. Costing around £600,000, the works would employ about 20 skilled operatives and specialists from oversea and 130 local trainees.

SINKING STAPLE SHAFTS

in Belgium

ORIGINALLY developed in the Ruhr district, the technique of sinking a staple shaft after drilling a large-diameter pilot was applied for the first time in Belgium at the Les Liegois Colliery, near Zwartberg, for a staple shaft of 1,260 ft. in depth. Staple shafts are an important link in the mainly level coal seams of Belgium, won by the horizon system of mining, and over 15,000 ft. of staple shaft had to be sunk in 1957. An account of sinking this 15-ft. dia. staple shaft to join the six levels from the 2,150-ft. to the 3,313-ft. level was published in the Bulletin Technique-Mines, Institut National de l'Industrie Charbonnière (April, 1960).

Most of the strata are composed of shale and only about 15 per cent. consists of sandstone. A number of coal seams are intersected, amounting in the aggregate to about 5 per cent. of the section.

Drilling and sinking was completed in five sections of 200 to 330 ft. each, corresponding to the vertical distances between the levels. Not only did this limit the possible deviation of each pilot hole, but it also enabled drilling to continue at lower sections while the first section from the 2,150-ft. to the 2,350-ft. level was being widened.

A Turmag drilling machine type P VI/12 was used for all drilling operations. A 5⅝-in. dia. hole was first drilled upwards the full length of the particular section and this was subsequently reamed in a downwards direction to a diameter of 10⅝ in., 16 in., and finally 24 in., *i.e.*, in three reaming passes.

Deviation in Pilot Holes

Before drilling commenced, the drill rig was very carefully aligned and its steel frame set in concrete blocks. The starting point for the first hole was the centre of the shaft and it was aligned perpendicularly. Its deviation was found to amount to only 3 ft. from the shaft centre. The pilot hole for the second section was again started in a perpendicular direction, but 3 ft. off centre, yet the hole at the higher level was still about 1 ft. off centre. The setting for the second hole was then repeated for all subsequent holes and all arrived within the cross-sectional area of the shaft. The dip of the strata was favourable as it did not exceed 5 to 7 deg., but it was confirmed in every case that the bit always tended to turn so that it drilled at right angles to the strata.

The average depth drilled in one drilling shift was 33 ft. for the 5⅝-in. holes, 41 ft. 8 in. for the 10⅝-in. holes, 32 ft. 6 in. for the 16-in. holes, and 8 ft. 2 in. for the 24-in. holes. The total number of shifts for the five shaft sections, subdivided into drilling shifts and other working shifts, amounted to 23 and 35 (183 ft.), 37 and 48 (193 ft.), 58 and 91 (185 ft.), 60 and 72 (311 ft.), and 45 and 66 shifts (221 ft.). The distances in parentheses relate to the depth of the particular section.

A total of 89 shifts was lost due to breakdowns. On three occasions, the water-tube sealing ring failed. The water exit holes at the drilling bit became choked four times and the bit had to be withdrawn from the hole and cleaned. A number of improvements had to be made to the guide rods before they ceased to give trouble. During the reaming operations to 24 in. dia., four drill rod fractures occurred. Once, the hole walls collapsed over a length so that the bit became buried and four and a half shifts were needed to free it. A second collapse necessitated the descent of a miner on a rope into the 24-in. dia. hole into which a 20-in. dia. steel tube had been lowered and it took nearly four shifts to transfer the blocking debris into a bucket.

Sinking operations started as soon as the 24-in.

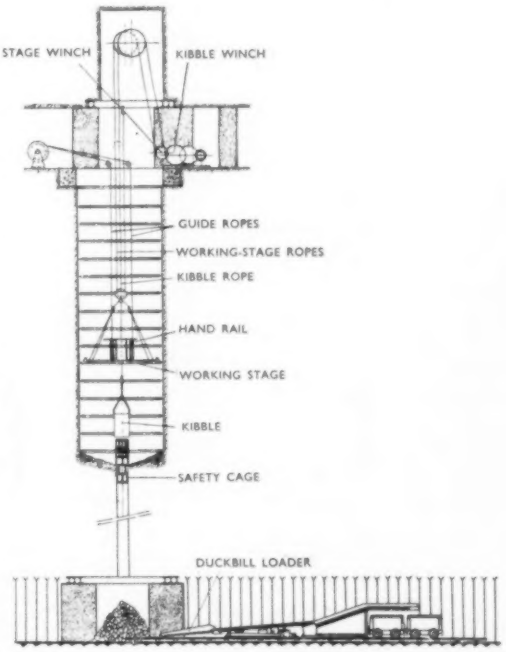

FIG. 1.—EQUIPMENT FOR SINKING STAPLE SHAFTS BY THE BOREHOLE METHOD.

pilot hole in any section was completed, Fig. 1 showing the equipment required.

Since the 2,150-ft. level was not needed as a decking inset, it was used as the engine room to house the winches. The kibble winch had a 1-in. dia. rope and was driven by an electric motor. The winch for the sinking stage had a $\frac{7}{8}$-in. dia. rope, running over a pulley block, with the free end fixed to a beam underneath the sheaves. Two small winches held the two kibble guide ropes and a hand winch was used for the plumb-line.

Wet drilling was rejected for the shotholes, as it might have caused the rock of the pilot-hole walls to flake off and lead to jamming, and dry drilling with dust collectors of the Königsborn type was introduced. Although comparative tests showed that the rate of penetration with this type of dry drilling was about 20 per cent. slower than with conventional wet-drilling methods, this was largely offset by the absence of jamming, by the greater safety, and by the fact that the shotholes did not need to be blown clear of water before charging.

Need for Good Fragmentation

To make sure that all debris passed through the 24-in. pilot hole, good fragmentation was required. Fig. 2 shows the drilling pattern of 43 holes adopted for the rounds in shale. For sandstone, a similar pattern of 62 holes was used. Each round required 47½ lb. of explosive (Dynamite No. III) in shale and each sandstone round 71½ lb. of explosive. The average advance of a 4-ft. 7-in. round was 4 ft. 3 in. Drilling of one round took on an average 1½ hr. and charging 1 hr.

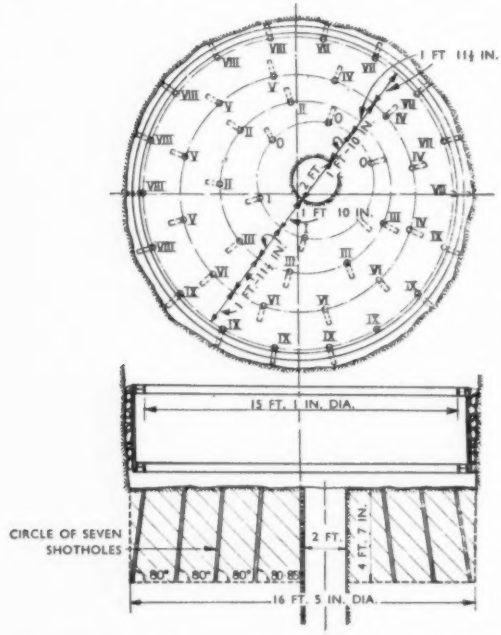

FIG. 2.—DRILLING PATTERN FOR A ROUND OF 43 HOLES IN SHALE.

In order to prevent accidents to the sinkers, a safety cage, 8 ft. high, consisting of a number of hoops joined by eight 1½-in. dia. steel rods was lowered into the pilot hole mouth after blasting each round. Before shotfiring operations it was raised and replaced by a 70-ft. chain suspended from a rope which was lowered into the hole to prevent jamming.

During the whole sinking operations over the total excavated depth of 1,086 ft. there were 29 cases of jamming of debris across the mouth of the pilot hole, four cases of jamming inside the hole and two in the lower part due to inadequate withdrawal of the muck. Steel rods with pointed ends were used to clear the hole and the time taken for one operation varied from 1 hr. to 80 hr. Altogether 357 working shifts had to be spent to clear the 35 blockages, *i.e.*, 7.7 per cent. of the total sinking time.

Some 20 to 25 per cent. of the debris was thrown by the blast straight into the hole. Clearing the upper shaft rings from debris and shovelling the rest of the muck pile into the hole took on an average half a shift. When a bed of soft shale was crossed, the pilot hole collapsed over a length of 90 ft. and the cavity had a diameter of up to 12 ft. Lengths of 24-in. dia. steel tubing were inserted at this point and the void filled out with fagots. A duckbill-type of loader was installed at the discharge end of the pilot hole to load on to a short gate-end loader and then into tubs.

The lining for the upper shaft sections down to the 3,313-ft. level consisted of steel rings of 4-in. H-section girders, spaced 3 ft. 3 in. apart. Each ring was built up from five arched sections of 9 ft. 6 in. length, joined by two clamps, which allowed a clearance of 2 in. at the butt ends. Every other ring was reinforced by two cross struts which also serve as buntons (Fig. 3). Each succeeding ring is suspended from the upper ring by 10 tie-rods of ¾-in. dia. steel or of 2½-in. by 1⅝-in. channels. The lagging consisted of corrugated steel sheets, 7 in. wide, which were suspended on hooks from the rear flange of the shaft lining rings. It took 1½ hr. to place the 80 sheets required for one ring. In addition, one in six rings was anchored by seven steel spikes of 1⅛-in. dia. round steel, driven 5 ft. into the walls. Every 80 ft., a brickwork structure was erected which supported two 10-in. girders of 20 ft. length placed directly under the cross struts.

As indicated in Fig. 3, one compartment of the shaft served as a ladder way. The platforms for the ladders are spaced 20 ft. apart. The feet of the ladders are placed into short pipe ends welded to the platforms. Steel rods of ¾-in. dia. are bolted between the cross struts and form a screen between the cage compartment and the ladder way.

The lowest section of the staple shaft was lined with formed concrete blocks 18 in. thick and each weighing 75 lb. because it was feared that the proximity of a large tectonic fault would result in much higher thrusts at this point. Suitable gaps

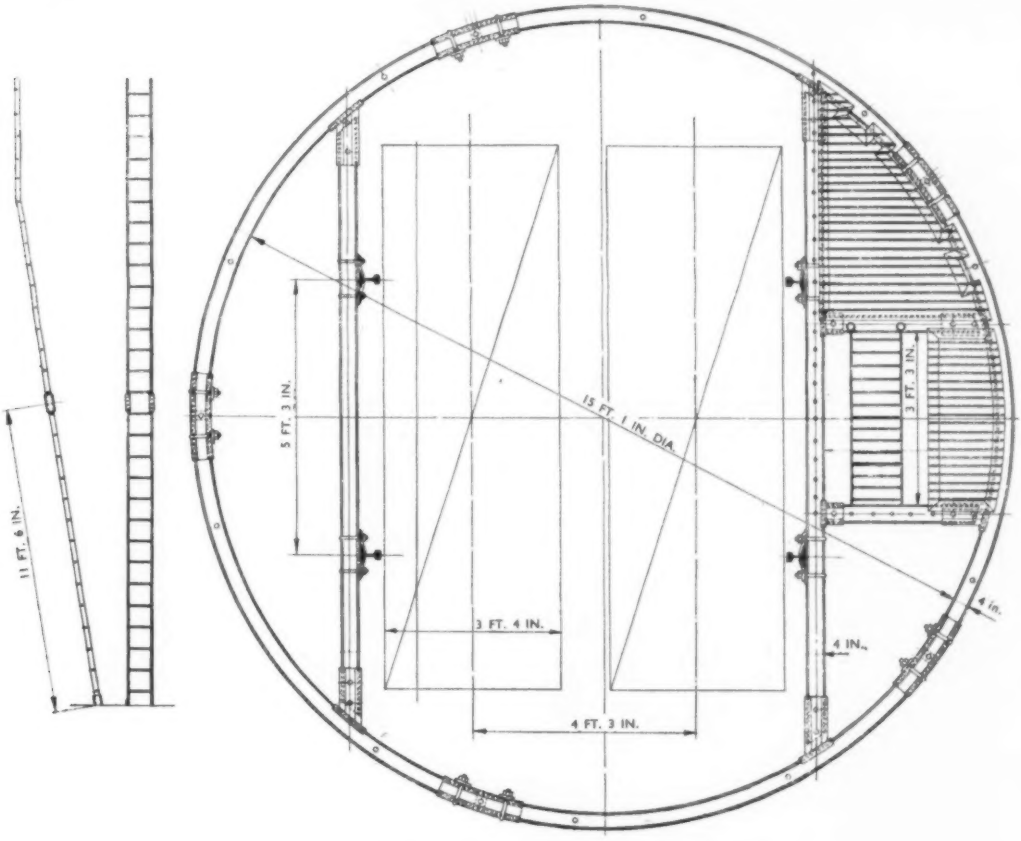

FIG. 3.—FURNISHING DETAILS OF THE COMPLETED SHAFT.

were left for the buntons and the space behind the blocks was filled with concrete. The shaft sump was also lined in a hemispherical form by inverted steel arches, with the space between and behind them filled with concrete.

Cycle Times and Sinking Costs

In the shaft sections with steel lining, where the average advance of one round was 4 ft. 3 in., the daily advance amounted to 5 ft. 11 in. The times taken for the various operations were as follow:—Drilling and shotfiring, 260 min.; loading, 390 min.; lining, 80 min.; lagging, 120 min. Every 20 ft., cross struts, platforms and ladders were fixed, which took 7 hr. and every 59 ft., two support girders were placed in position, the work taking 10 hr.

In the section with concrete lining, with an average advance of 3 ft. 10 in. per day, the times required for the completion of a 6-ft. 7-in. section were as follow:—Drilling and shotfiring, 6 hr.; loading, 9½ hr.; placing guide ring, 1 hr.; setting form blocks, 15 hr.; removal of gear, 2½ hr.

The final shaft fittings included a 350-h.p. electric Koepe winder and two cages with two decks, for one 2½-cu. yd. mine car per deck.

The sinking costs for the section lined with steel rings, with a useful sectional area of 180 sq. ft., are stated to be about £87/ft.. Of this cost, 30 per cent. is due to the steel lining and lagging. In the section with formed concrete blocks, the costs were 10 per cent. higher, but the excavated area in this case had to be 16 per cent. more than in the steel-lined section. No strictly comparable costs for conventional sinking operations are available, but a staple shaft of 86 sq. ft. useful cross-sectional area, lined with timber, costs in Belgium about £38/ft.

Theory of the Alloys of Copper

Prof. W. Hume-Rothery, FRS, of Oxford University, is to give a lecture on "The Theory of the Alloys of Copper" under the auspices of the Metal Physics Committee of the Institute of Metals at the Royal Institution, Albemarle Street, London, W.1, on February 23 at 6.30 p.m. Visitors will be welcome.

New Equipment and Products

Crawler-mounted Drill Rig

POWERFUL crawler-mounted drill rig (Fig. 1) which, with a towed air compressor forms a self-propelled unit capable of being operated by one man and carrying a SL.160 Holman heavy drifter, was shown at the recent Public Works Exhibition in London by Holman Bros., Limited, Camborne (Cornwall). The power unit, known as the Holman Holtrac, is air operated through an eight-plate "Bristol Tractor" clutch made up of two Holman 5R Rotomotors, each of 7½ h.p. capacity. Maximum track oscillation over all types of ground by means of an articulated action system, ensures stability and manœuvrability under adverse site and quarry conditions. All hydraulic and pneumatic controls for the carriage are concentrated on one panel, while dual control for the drifter and the feed motor is provided at the slides.

Boom movement and feed positioning are finger-tip controlled and permit pattern drilling at almost any angle. The hydraulic movements include elevating, lowering, and slewing of the boom, and dumping, swinging, and crowding of the drill carriage. The reach is such that breast holes 8 ft. 9 in. up from ground level and spaced 7 ft. 6 in. apart can be drilled from one setting. The driver's seat reduces fatigue and increases both work output and safety factor. A dead-man control automatically returns the control levers to neutral and applies powerful air brakes, when released. A pedal-operated air valve, which can only be operated from the driving seat, is fitted as an additional safety feature. For dry drilling, effective dust suppression is achieved with a dust eductor unit which blows dust and chippings a safe distance away.

FIG. 1.—HOLTRAC CRAWLER-MOUNTED DRILL RIG.

Davis Magnetic Tube Tester

THE Davis magnetic tube tester is used for determining the magnetic content of ores and it is particularly suitable for checking the efficiency of wet magnetic separators recovering magnetite and ferro-silicon in heavy-media processes. For the manufacture

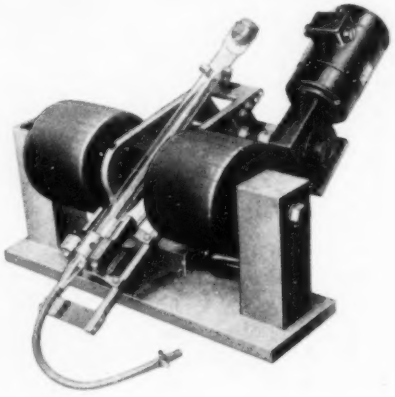

FIG. 2.—DAVIS MAGNETIC TUBE TESTER.

of this appliance, Rapid Magnetic, Limited, Lombard Street, Birmingham 12, has the exclusive licence.

The tester (Fig. 2) consists of an inclined glass tube set between the pointed poles of a powerful electro or permanent magnet. The ore sample is introduced into the water-filled tube and agitated in such manner as to ensure thorough washing of the arrested magnetics. The unit is continuously rated, having a power consumption of 230 W., the motor drive being $\frac{1}{20}$-h.p. Overall dimensions are:—28 in. by 26½ in. by 12 in.; nett weight, 280 lb.; gross weight, 380 lb.

Shin-bone Protectors

SHIN-BONE protectors have met with great success in Germany, where they are used extensively in various heavy industries, and in particular for coal and other forms of mining. Indeed, no one is allowed to descend a mine without them.

German industrial companies are assessed for accident insurance according to the number and severity of the accidents occurring in their factories each year, and shin-bone injuries have proved to require long periods away from work for those unfortunate enough to incur them, resulting in a correspondingly high level of sick benefit payments. The use of "Ritex" shin-bone protectors (Fig. 3) has cut down the incidence of this kind of injury to such an extent that insurance premiums have been significantly lowered because of the corresponding reduction in sick benefit claims which the insurance companies have had to meet.

While in this country sick benefit insurance comes under the State, the important fact remains that this

German experience proves the effectiveness of the "Ritex" protector beyond doubt, and commends it at once to all industrial companies who are concerned with finding new and better ways of preventing unnecessary injuries, and the consequent waste of man-

FIG. 3.—SHIN-BONE PROTECTORS.

power. The protectors are exceptionally well made, being designed for hard use and long wear in both metal and a specially tough grade of plastic, with leather straps. Heafield Industries, Limited, Spa Lane, Derby, has the sole agency in Great Britain for these shin-bone protectors, which are made by Henrich Rohden, of Essen.

Permanent Magnetic Circular Chuck

FOR certain types of lathe work there are obvious advantages in the use of a permanent magnet circular chuck. A new product has recently been added to the range made by Darwins, Limited, Tinsley, Sheffield 9. Known as the Darwins-Fimax, it has a high-quality manganese bronze body with radial poles, ensuring maximum holding of the workpiece without distortion. A unique feature of the chuck is the removable central adaptor plug, which, when in position, ensures that the magnetic flux extends over the full chuck face area. The adaptor is secured by a cap screw which prevents rotation, enabling large or small components to be held firmly for machining. Removal of the screw and adaptor plug enables drilling, boring, reaming, and grinding operations to be performed at one setting.

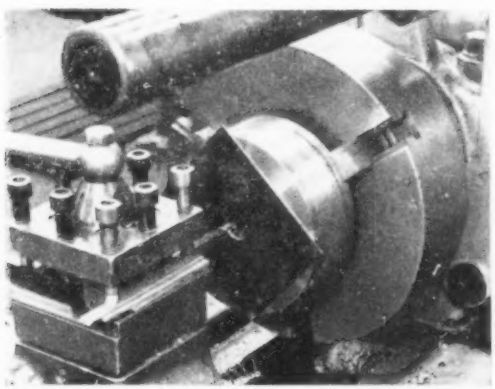

FIG. 4.—PERMANENT MAGNET IC CIRCULAR CHUCK.

Spigoted workpieces can rapidly be set concentric using non-magnetic bushes, eliminating the need of indicator clocking, while bored workpieces can be set concentric by use of a stub mandrel, both being useful features for repetition work.

The chucks for lathe work incorporate Alcomax III permanent magnets, produced by Darwins, Limited, which ensure a chuck of extreme holding power. The range of chuck sizes with (in parentheses) the number of poles, is as follows:—6-in. dia. (10); 9-in. (14); 12-in., 18-in., and 24-in. (18). The thickness of the smallest diameter is 2½ in. and of the largest, 3¼ in. Fig. 4 shows a magnetic chuck in use.

Wheeled Outriggers for Mobile Cranes

WITH practically all but the smallest type of self-propelled and truck cranes it is necessary to use telescopic outriggers and screw jacks to obtain maximum lifting capacity, a practice which seriously restricts any chassis movement of the vehicle. This restriction limits the usefulness of a crane when lifting loads without the use of outriggers and stabilizing jacks.

FIG. 5.—WHEELED OUTRIGGERS FOR MOBILE CRANES.

An innovation introduced by Steels Engineering Products, Limited, Crown Works, Sunderland, is designed to permit forward and reverse movement of a crane with outriggers extended, and with a heavy or even maximum load on the hook. It consists of a rocking beam suspension bogie mounted on each of the four outriggers to replace the usual blocks or packing (Fig. 5). Each bogie has two rollers fitted with solid rubber tyres.

The one condition necessary to use this equipment is a reasonably level, well-made road. Granted that facility the new accessory is claimed to make available to a crane of up to 25 tons capacity, in a mobile condition, duties which would normally be possible only by the use of blocked stabilizers.

New Literature

HOUSE magazines, catalogues, and other publications recently received include those mentioned below. Readers wishing to obtain a copy of any of the publications referred to should apply direct to the address given, at the same time mentioning IRON AND COAL.

MOND NICKEL COMPANY, LIMITED, Thames House, Millbank, London, S.W.1—Nickel-containing stainless steels, which are responsible for approximately 32 per cent. of the free world's nickel consumption, are featured in some of the main articles in the latest edition of Inco-Mond Magazine (No. 16).

NATIONAL SOCIETY FOR CLEAN AIR, Field House, Breams Buildings, London, E.C.4—A report of the society's conference and exhibition at Harrogate last October is included in the winter number of Smokeless Air (price 2s.). There are many other features to interest those who are anxious to remove the causes of air pollution.

ATLAS COPCO (GREAT BRITAIN), LIMITED, Maylands Avenue, Hemel Hempstead (Herts)—Latest issue (No. 4, 1960) of Compressed Air Comments contains an article on "Thread Connections in Long-hole Drilling," by Ing. K. F. Lautmann, manager, market service and export sales, Sandvik Steel Works Company, Limited, Sandviken, Sweden, and a number of other contributions.

MAVOR & COULSON, LIMITED, Glasgow, S.E.—"Price 4d. to employees" states the contents page of the M&C Apprentices' Magazine, the winter number of which is available. It is certainly good value. The articles, on a variety of subjects, are both entertaining and informative, while the news from the various branches of the company is presented in a very readable manner.

WILD-BARFIELD ELECTRIC FURNACES, LIMITED, Elecfurn Works, Otterspool Way, Watford By-Pass (Herts)—Main features of the December number of the Wild-Barfield Heat-treatment Journal are "The Use of Controlled Atmospheres in the Heat-treatment of Metals," by Mr. L. G. W. Palethorpe, the company's chief metallurgist, and an article on "Electric Bell Furnaces for Heat-treating Stainless Steels."

D. MACINTYRE & SON, LIMITED, 33, Brighton Road, South Croydon (Surrey)—This company has been appointed agent for Great Britain, Ireland, Australia, New Zealand, and South Africa for Salzgitter Stahlbau, G.m.b.H., which manufactures spiral welded pipes from 16 in. dia. up to 64 in. Full details of the Germany company's products are contained in a catalogue, handsomely bound and with provision for the inclusion of future supplements.

W.G.I., LIMITED, Albion Ironworks, Miles Platting, Manchester 10—During the past year the companies of the West's group of industries have continued to broaden the basis of their operations and this is reflected in their excellent house magazine. In addition to articles on the group's technical activities, the December number of West's Magazine gives news of employees, holiday photographs, and other features common to similar publications.

STANTON IRONWORKS COMPANY, LIMITED, near Nottingham—If the photographs published month by month in The Stantonian are anything to go by—and we have every reason to believe that they are—employees at Stanton are a happy crowd. Whether "snapped" as they work or taken in more formal groups, they invariably look industrious and contented. The December issue carries 50 pages of interesting articles and news items and many photographs of the type we have referred to.

SOCIÉTÉ COCKERILL-OUGRÉE, Service "Publicite," Seraing, Belgium—The New Year brings the first number of the company's Technical Review, the early pages of which are, appropriately, devoted to a summary of the undertaking's far-reaching activities. Among the articles in this impressive first issue are contributions on diesel hydraulic industrial locomotives and gas-tight containment vessels of the BR2 and BR3 nuclear reactors at Mol. The magazine is attractively presented, generous use having been made of colour printing.

HAWKER SIDDELEY GROUP, LIMITED, 18, St. James's Square, London, S.W.1—From the point of view of presentation, the Hawker Siddeley Technical Journal is perhaps unrivalled in its field. The illustrations, both tones and lines, are first class, colour being introduced with discrimination. The November issue, which has only lately made its appearance, includes articles on "Steam Conditions for Marine Organic Moderated Reactors," "A Special High-pressure Back-pressure Turbine for the Oil Industry," "Developing a Pipe Perforator," and "The Development of the Modern Digital Differential Analyser."

NATIONAL COAL BOARD, Chancery House, Chancery Lane, London, W.C.2—Tirpentwys Colliery is passing through a somewhat difficult period, but its problems are being overcome. NCB investment in the Cwm Nantddu Valley has given fresh heart to men who have long and stubbornly worked in difficult circumstances. The story is told, accompanied by a selection of photographs, in the January number of Coal Magazine (price 4d.), which also features Silverdale Colliery—"this modernized colliery was once a group of stone and coal pits in Staffordshire's ironstone days."

JOHNSON, MATTHEY & COMPANY, LIMITED, Hatton Garden, London, E.C.1—January issue of Platinum Metals Review, the quarterly survey of research on the platinum metals and of developments in their applications in industry, contains an abridged version of Michael Faraday's lecture on platinum, delivered to members of the Royal Institution on February 22, 1861. Other articles in the issue include "Rhodium Plating to Specification" by R. R. Benham, "The Hydrides of Palladium and Palladium Alloys" by Dr. F. A. Lewis, and "Platinum Alloys in the Production of Viscose Rayon" by Dr. J. W. S. Hearle and Dr. A. Johnson.

VICTOR PRODUCTS (WALLSEND), LIMITED, Wallsend-on-Tyne—Among the contents of the December issue of the Victor Magazine is the third of a series of articles by Mr. W. G. Miller, managing director of the company's agents in India, Geo. Miller & Company, Private, Limited, on "Business Hunting in India." Readers of the previous articles will need no incentive to continue the series—and there is at least one further instalment to come. Also well worthy of attention is "Work Study as an Aid to Industrial Efficiency," by Mr. R. W. Mann, managing director, this being a reprint of a paper which the author presented to the Work Study Club of the Tyneside Productivity Committee.

COLD EXTRUSION OF STEEL CONFERENCE

Cold Forging of Steels

by F. GRIFFITHS

The following is an abstract of one of the papers presented at a conference on "Cold Extrusion of Steel." The conference, organized by the Institute of Sheet Metal Engineering, was held in the City Hall, Sheffield, from November 21 to 23. Mr. Griffiths is chief production development engineer of the British Motor Corporation, Limited.

THE cold forming of metals has been used by the engineering and production industries for many years, but it has been carried out mainly on materials which are of a non-ferrous nature. Since the beginning of the last world war, a considerable amount of work has been done in different ways to form steels into various shapes while it is cold.

The main emphasis has been on extrusion, either continuously through a die or in a semi-open die, which has either resulted in bars of cross-sectional profiles or the production of components of a cylindrical nature. Today, a very considerable amount of work is being done around the principle of producing steel components out of closed dies similar to those used in the hot forge and, a very large amount of success has been achieved.

In 1953 a very comprehensive conference was held in England by the Sheet and Strip Metal Users' Technical Association (now the Institute of Sheet Metal Engineering), mainly on forward and backward extrusion of metals into cylindrical form components. The conference, as a whole, remained much too technical and industry seemed unable to translate any of the results of the proceedings into practical action.

Some three or four years ago the British Motor Corporation moved into the cold forming of components as a result of the very considerable wastage of steel caused by the hot-forging process which is generally used by the automobile industry to produce the components it uses, and by the waste on components produced out of bar automatic machinery.

The 1953 conference in England, the work at the ordnance factory, and the work done in Germany and in America, showed that the cold forming of steels was a practical proposition. The problem that presented itself was to make the process thoroughly economic in its own rights. This, to a large extent, has been done, and it can be firmly stated that the cold forming of steel components can take the place of steel components produced by the hot-forging processes, and does not depend on what savings can be made in the deletion of machine-shop operations.

The results of the investigation into cold forming have shown that the difficulties do not lie in the actual cold-forming operation, but are involved in the cost of the capital equipment and the manufacture of pellets, and solid and hollow billets.

Capital Equipment of Cold Forming

One of the first problems that arises with cold forming is when the process is used for the purpose of component production, and is, what is to be the final form to be produced by the process and how much modification to the fundamental billet has to take place in order that this final operation may be done. For some time to come the stage or stages between billet and final forming will be in the nature of a guess, which, of course, will be tried out before final production machinery is purchased and installed.

It is very important today that any producing unit which is thinking of entering cold forming, should install at least a 1,500-ton hydraulic press, second-hand or new, in order that the guess may be tried out and proved. There has been, in Great Britain, an effort between the Production Engineering Research Association and a press manufacturing company to produce a press for this purpose, but the end result has turned out to be a press of a ridiculous capital cost and therefore of no use to industry. The British Motor Corporation has installed an old wartime hydraulic press, obtained at a very low figure, and it has been found extremely satisfactory for the experimental work which has been done.

It is strongly recommended that work in the cold forming of steels shall be carried out on hydraulic, not mechanical, presses and the problems of the economics concerned with this will be dealt with later in this paper. The advantage, particularly of a hydraulic press in the initial stages of proving what can or cannot be done in a practical way, is that pressures can be maintained over long strokes. Pressure and stroke can also be varied on such a press.

Tool Cost of Cold Forming

There is a conception in various quarters that tools for cold forming are necessarily very expen-

sive; this is not so. The cost of these need only be the same as the hot-forging die cost, plus a small amount of cost for polishing. Before describing the process and the general economics of the operations involved in the cold forming of a steel component we will consider the two types of components which are normally required and which involve a certain line of activity to arrive at a satisfactory economic end result. These two types of components are the regular shaped components which are more or less circular in form, the tools for which can be produced by the normal tool-room methods of turning, milling, boring, grinding, gear cutting, etc., and the irregular shaped component, the dies for which would be produced by the normal die-shop method of marking out, machining on a die-sinking machine, and then finishing off on a bench, using plate gauges as the main means of measurement. The fundamental differences between the manufacture of cold-forming of these two types of components are in the manufacture of the preforms and the capital cost of the plant into which the tools are to be placed. These will be dealt with in their respective places in this paper.

The problems required to be resolved about the work that has to be done to make a component by the cold forming of steel into dies, form themselves into a fairly simple group of fundamental issues, such as pellet, billet, or hollow billet manufacture, the exact nature of preforms, the final shape of the component out of the last die, the effective lubrication of the metal surfaces, the economic annealing, and finally, the right type of capital equipment with the right capital cost.

Choice of Equipment

Generally speaking, it has been known since the cold forming of steel or any other metal was embarked upon, that the right piece of capital equipment would be one that was operated by hydraulic power, but like much of the world's capital equipment, the hydraulic press, which started its life in the early period of the industrial revolution as a thoroughly simple unit, has been elaborated to an almost ridiculous extent in order to allow the salesman of the press the widest possible field of sale.

Because of the cost of a hydraulic press, the pioneers in cold forming have tried to use a mechanical press which not only is unsuitable as a whole for the cold-forming process, but which also has to be covered by safety devices. We, in Great Britain, realized the significance of this, and have engineered hydraulic presses for the cold-forming processes, which are now being bought at a thoroughly economic cost.

TABLE I.

Tonnage.	Messrs. A.	Messrs. B.	Messrs. C.	Messrs. D.	Messrs. E.	Conventional presses.	
						Hydraulic.	Mechanical.
	£	£	£	£	£	£	£
150	3,160	—	4,591	3,593	—	8,400	4,700
250	4,398	—	4,827	4,500	4,125	12,000	5,700
350	5,262	6,204	5,530	—	—	14,000	9,000
500	7,044	—	5,747	6,386	6,613	16,000	10,000
700	10,364	—	6,825	7,730	—	22,000	12,000
1,000	14,140	—	7,700	9,020	9,950	40,000	16,000

Table 1 gives typical examples of what can be purchased on the British market. Firms A, B, C, D, and E, have been approached to design a press which consists of an anvil with two vertical members, and a bridge piece with a piston in it driven up and down by a hydraulic pumping unit. In deciding the issues and costs involved, and the final costs of these presses, it was realized that speed, when using hydraulics, does increase the capital costs, so it was decided that the normal 10 in./sec. which was used as a figure for cold forming should be tried out to see whether these high speeds were necessary. It was found that $\frac{1}{4}$ in./sec. in the majority of cases worked just as well, and in some cases much more satisfactorily than 10 in./sec. so that these prices are for a speed of $\frac{1}{4}$ in./sec. Should an increased speed on this be required, all that is necessary to do is to change the pumping unit.

These machines will be the basis of all future movement into cold forming in Great Britain, and there is no doubt that they will set the pattern for the rest of the world.

Preform Requirements

In dealing with regular forms, the preforms are not of a serious nature, except in the case of the preform that requires a hole through it. The question in this case is whether it is cheaper to put the hole in with two or three low-tonnage operations, or whether it can be made in a more basic way, as a hollow billet. In Great Britain at the present time the only effective hollow billet industry which supplies the hollow billet for the tube mills, machines the billet out of solid bar and so wastes the material which comes from the hole. We are inclined to think that the low-tonnage press will come much cheaper than the normal hollow billet method.

In any case, the hollow billet must begin its life as a bar of steel, and, like the pellet and solid billet, will have the same problems to contend with. The bar delivered to industry from the bar mill is still a rough bar, not very accurate in size and with quite a large number of surface cracks, etc. It has been decided to accept the normal end product of the steel mill and use it as efficiently as possible. This means that nearly all bar that is used for cold forming must have the diameter machined so that all surface cracks are removed and so that there can be good control over the volume of metal that is to be put into the cold-forming die. The parting of the billet or pellet is a problem not very technical but a problem of economics. A billet which may be of a fairly large diameter with a very short length if it was parted off with a saw or parting-off tool, could quite easily have a big proportion of waste to its finished volume. A much larger billet with a large ratio of length to diameter would have its parting off waste of a very small ratio to its finished volume.

The machine-tool industry of Great Britain was

approached to make a billet 1½ in. dia. and 3½ in. long, and a quote was put in for about £8,000 for capital equipment to do this job. It was realized that the amortization of this would not be at all satisfactory in producing the billet, so further efforts were made to use an old capstan lathe by adding bar feed and a sequence control unit to make the capstan automatic. This was done for £1,000 and has proved thoroughly economic.

In the making of the pellet billet, hollow billets or preforms it is desirable for the production engineer to produce an economic piece of capital equipment to do this operation and, particularly a piece of equipment that can be put into the production line and not become an installation with much "carrying to and from." The irregular-shaped component requires a large amount of work to be done on the preforms. It is very necessary to adopt a way of manufacture particularly away from the hot-forging technique, where the metal that is not required is squeezed out sideways and then clipped off.

Between all cold-forming operations it is necessary to use a lubricated surface on all the preforms that are put into the tools. With this lubricated surface, as with the die steels and with the fundamental steels that are used for the components themselves, nothing new need be asked for. For the lubrication process, a plant is used whereby the preforms are degreased in an alkaline medium, hot- and cold-water rinsed, phosphated, cold-water rinsed, acid pickled, cold- and hot-water rinsed, and then has a lubricated surface added finally. The author's company is using a soap surface, the trade name of which is "Bonderlube," and at present this seems most satisfactory.

Annealing, which is another inter-operational process, is required when deformation has reached a certain limit. Inter-operational annealing again wants cheap capital equipment which can be put into line-flow. This is at the initial stage of development in the United Kingdom, and it is hoped that before long the pattern will have crystallized into what the future type will be.

Among the steels used in the United Kingdom for general forged component use, by far the greatest portion, it appears, can be used without any problems. It is not quite certain yet whether certain inclusions and variants normally produced by the steel industry will produce problems or not. The use of lower-grade steels, by taking advantage of the work-hardening produced by cold forming, is something which, by producing a saving in the machine shop, can contribute to the economics of cold-forming, but are not, in the early days, a fundamental economy, but could easily be of a considerable nature. The die steels that are used are the normal ones which have been developed in the United Kingdom, and can be purchased on the open market.

Whereas thousands of components are obtained from a die in the hot forge, tens of thousands of components can be produced from a die during cold forming. In fact, generally speaking, if the lubricated surface remains intact during the cold-working process, die wear will be negligible.

The British Motor Corporation does not intend to change the whole of the machine shop over to the cold-forming process. There is all the machinery *in situ* to make a component from a rough forging, and while it is insisted that the cold-forming process shall be economic in relation to the hot forging, savings will, of course, be made on the machine-shop floor to a very considerable extent. It is also expected that it will be possible to take out of the machine shop all the metal-removing operations, leaving in only those operations which will be sizing and finishing. In place of these metal-removing operations there is no reason whatsoever why all regular-shaped components should not be removed from the hot forge and have the cold-working process installed into the machine shop at the beginning of each producing line. The capital cost of equipment is now of sufficiently economic cost that independent plant for each component can be used and installed in line flow.

As the problems of the irregular-shaped component are resolved, there will also be moved into the machine shop and the hot forge, as such, will be left with the manufacture of the small quantity large components for which cold forming will be impracticable.

Examples of components that have been developed by cold forming, and are being put into production by the British Motor Corporation include a propeller shaft flange, driving flange, 2nd speed synchronizer 2nd speed mainshaft gear, differential pinion, valve spring cup, and 1st speed wheel. Billet size finished diameter and material saving over hot forging is given for each example.

It is concluded that cold forming of steels is a perfectly practical proposition and can be engineered to be a thoroughly economic alternative to hot-forging. The potential savings in using cheaper grade material, and the enormous saving in the machine shop are such that no production engineer can afford to ignore these potentialities and refrain from making the fullest use of experiments and development work to use the process in a practical way.

English as Key to Advancement

"ENGLISH is the key to a large part of the world's store of information, and the printed word—in English—is the channel by which it is conveyed," says the British Council's report for 1959-60, describing how the council promotes oversea knowledge and use of British books and periodicals. As a result of the Government's decision to encourage further the flow of British books and periodicals oversea the council has undertaken a large expansion of its libraries and the services based on them. In 1959-60 it was maintaining 100 libraries, regularly supplying books to some 60 more and setting up 22 others. To all these over 200,000 books were sent and 100,000 more were presented to local libraries. Total stocks in libraries directly controlled ran to nearly 1,000,000 volumes.

This is believed to be the most widespread service of its kind in the world; in some countries these libraries are almost the sole source of supply of the printed word in English. The report is available from the British Council, 65, Davies Street, London, W.1.

Forthcoming Events

JANUARY 17

Institution of Engineers and Shipbuilders in Scotland:—Meeting at 39, Elmbank Crescent, Glasgow, C.2, at 6.30 p.m. "Some Problems in Shipbreaking," by M. Wilkinson.

Institution of Production Engineers (London Graduate Section):—Meeting at 10, Chesterfield Street, Mayfair, London, W.1, at 7.15 p.m. "Modern Welding Techniques," by W. H. Holland.

Institution of Electrical Engineers (Southern Centre):—Meeting at the Technical College, Farnborough, at 6.15 p.m. "Modern Ferro-magnetic Materials," by Dr. F. Brailsford.

JANUARY 18

Midland Counties Institution of Engineers:—Meeting in the new lecture theatre in the T.1 building of Nottingham University (adjacent to the new Mining Department), at 3 p.m. "A Heating Experiment to Determine the Thermal Constants of Rocks *in Situ*," by Dr. A. F. C. Sherratt and Prof. F. B. Hinsley.

Mining Institute of Scotland:—Meeting at the Mining Laboratories, 79, Grassmarket, Edinburgh, at 5.15 p.m. "Forth Road Bridge Anchorages," by the engineering staff of John Howard & Company.

Wigan and District Mining and Technical College:—Meeting in the Board Room at 5 p.m. "Planned Maintenance," by E. Loynes, chief electrical engineer, North-Western Divisional Coal Board.

Society of Chemical Industry (Corrosion Group):—Meeting at 14, Belgrave Square, London, S.W.1, at 6 p.m. "Metallic Diffusion Coatings," by R. L. Samuel.

Institution of Production Engineers (Birmingham Section):—Meeting at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 7 p.m. "Design and Production Engineering of Materials Utilization," by B. H. Dyson.

Institution of Production Engineers (Wolverhampton Graduate Section):—Meeting at the Wolverhampton and Staffordshire College of Technology, Wulfruna Street, Wolverhampton, at 7 p.m. "The Application of Electronic Computers to Production Control," by B. L. J. Hart.

Institution of Production Engineers (Peterborough Section):—Meeting in the Conference Room, Peterscourt, Peterborough, at 7.30 p.m. "Measurement of Time," by H. M. Smith.

JANUARY 18-19

Institution of Mechanical Engineers:—Symposium on "Pressure-vessel Research Towards Better Design," at 1, Birdcage Walk, Westminster, London, S.W.1.

JANUARY 19

Combustion Engineering Association (Western Region):—Meeting at the Park Hotel, Cardiff, at 10.30 a.m. "Heat Insulation," by Martin Edge (Cape Asbestos Company, Limited), and "Heat in Harness," a film by William Kenyon & Sons (Thermal Insulations), Limited.

Society of Instrument Technology (Grangemouth Section):—Meeting at the Leapark Hotel, Grangemouth, at 7 p.m. "Boilerhouse Instrumentation," by R. Barclay.

South Wales Institute of Engineers:—Annual dinner at the Park Hotel, Cardiff, at 7 p.m.

Institution of Plant Engineers (Blackburn Branch):—Meeting at the Castle Hotel, Blackburn, at 7.30 p.m. "Industrial Heating and Ventilating," by S. P. Fildes.

Institution of Production Engineers (Glasgow Section):—Meeting at 39, Elmbank Crescent, Glasgow, C.2, at 7.30 p.m. Open discussion night.

Institution of Production Engineers (Southampton Section):—Meeting at the Polygon Hotel, Southampton, at 7.15 p.m. "Production Control," by H. Horne.

Institute of Marine Engineers (Kingston-upon-Hull and Humber Area Section):—Meeting at the Royal Station Hotel, Kingston-upon-Hull, at 7.30 p.m. "The Future Doxford Marine Oil Engine," by P. Jackson.

Institution of Mechanical Engineers (Midland Branch):—Meeting at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 6 p.m. "Do Managers Manage?" by A. N. Giles.

Institution of Mechanical Engineers (Southern Branch):—Meeting at the Royal Beech Hotel, Southsea, at 7 p.m. "Some 'Trivial' Examples of Research in Mechanical Engineering," by W. J. Evans.

JANUARY 20

Sheffield University Mining Society:—Meeting in the Mining Lecture Theatre, St. George's Square, Sheffield 1, at 5 p.m. Sixth "Ira Statham" Lecture: "Reorganization Schemes in South Wales," by L. Walker, Area general manager, No. 6 Area, South-Western Divisional Coal Board.

West of Scotland Iron and Steel Institute:—Meeting at 39, Elmbank Crescent, Glasgow, C.2, at 6.45 p.m. "The Relative Merits of Different Steelmaking Processes," by T. F. Pearson.

JANUARY 21

Sheffield University Mining Society:—Annual dinner-dance at the Royal Victoria Hotel, Sheffield, at 6.30 p.m.

JANUARY 23

Institution of Electrical Engineers (Mersey and North Wales Centre):—Joint meeting with the Institution of Mechanical Engineers (North-Western Branch) and Liverpool Engineering Society at the Royal Institution, Colquitt Street, Liverpool, at 6.30 p.m. "Cybernetics," by Prof. J. C. West.

Institution of Electrical Engineers (Western Utilization Group):—Meeting at the South Wales Institute of Engineers, Park Place, Cardiff, at 6 p.m. "The Utilization of Electricity in Steelworks," by T. B. Rolls.

National Association of Colliery Managers

JANUARY 16

Midland Branch:—Meeting at the West Notts Technical College, Mansfield, at 6.30 p.m. Address by James Crawford, industrial relations member, National Coal Board.

JANUARY 18

North of England Branch:—Meeting at the Mining Institute, Newcastle-upon-Tyne, at 6.45 p.m. "Problems of Roadway and Face Support in Steep Workings Adjacent to the Butterknowle Fault," by D. H. Fawcett.

JANUARY 25

Lancashire Branch:—Meeting in the Lecture Room, Manchester Literary and Philosophical Society, George Street, Manchester. "Record Speed Tunnelling in the Burnley Area," by M. Daniecki, Area tunnelling engineer.

JANUARY 26

South Staffordshire, Warwickshire, Worcestershire, and Shropshire Branch:—"Management Structure," by Mr. De Ville.

JANUARY 27

Kent Branch:—Meeting at the Swan Hotel, Deal, at 7.15 p.m. "Planning a Trolley Locomotive Scheme at Chislet Colliery," by T. E. Green, chief traction engineer, NCB, and L. Neal, planning engineer, South-Eastern Divisional Coal Board.

Butane/Air Plant Installation at Hereford

ALTHOUGH W. C. Holmes & Company, Limited, Huddersfield, has designed and installed numerous liquefied petroleum gas plants in the past few years, the recently commissioned butane/air plant at the Hereford works of Henry Wiggin & Company, Limited, is of particular interest. It is the largest and most comprehensive installation in this country outside the gas industry.

The plant has been designed to store 500 tons of liquid butane (the equivalent of some 240,000 therms), and to supply the total gas requirements of a modern factory of 50 acres.

MOST OF THE photographs used to illustrate the 1961 wall calendar of the North-Western Divisional Coal Board are of underground mining equipment. Each sheet of the calendar carries the dates for three months.

Metallurgical Patents in the US

Some Recent Inventions

DESCRIPTIONS of metallurgical patents given below have been taken from details published in the Official Gazette of the United States Patent Office.

Flexible Gas Seal for a Blast Furnace

A flexible gas seal construction for the revolving distributor of a blast furnace has a rotating bell hopper defining an outer cylindrical face, comprising in combination:—A fixed support ring affixed to the blast furnace in the region of the juncture of the furnace and the bell hopper and extending around the hopper; a segmented ring mounted on the support ring and extending around the hopper, the rings coacting to define an annular chamber facing the hopper wall and having a generally rectangular cross-section with a downwardly bevelled inner roof surface. A sealing ring has an outer portion seated snugly in the outer portion of the chamber, an inwardly extending support portion being seated against the roof of the chamber and a depending flexible lip portion seated against the bevelled inner roof surface and extending inwardly of the same to bear against the hopper. A spring encircling the flexible lip below the lower margin of the ceiling of the chamber urges the flexible lip against the bell hopper at all times. —2,954,884.

Hot Extrusion of Metals

In a method of extruding a heated solid metal billet through a die to form a solid bar, steps comprise interposing between the leading end face of the billet and the die, prior to extrusion, an auxiliary metal part covering substantially the entire area of the leading end face. The auxiliary metal part and the billet, at the temperature employed for each of them, is such that the auxiliary metal part offers a lower resistance to deformation than the billet, the auxiliary metal part being of such thickness that it forms only a short cap on the front end of the bar extruded from the billet, extruding all of the auxiliary metal part and all but a small portion of the billet through the die. The billet has such poor ductility at the extrusion temperature employed that the front end of the extruded bar would crack if the auxiliary metal part were not employed, severing the front end portion of the extruded bar covered by the cap from the remainder of the extruded bar.—2,955,709.

Continuous Mill

A continuous mill has a work roll and a feed roll forming a sheet of stock on the work roll, the mill having an intake end and an output end, means located at the output end to remove milled stock a curling roll having a conical working face opposed to the work roll, the axis of the curling roll being tilted toward the intake end of the mill to bring one side of the curling roll into substantial parallelism with the work roll and to form a flaring pocket on the opposite side of the curling roll. Means drive the curling roll so that the parallel surfaces of the work roll and the curling roll are moving in opposite directions, whereby the sheet of stock on the work roll is coiled between the parallel surfaces of the work roll and the curling roll and progresses into the flaring pocket.—2,954,580.

Water-cooled Steel Skewback Channel for Furnace Roof

A water-cooled skewback channel for mounting upon a furnace side wall to support the furnace roof, comprises a metal plate having an inwardly disposed horizontal flange at its upper end, the plate being then disposed vertically downward from the flange and then being bent inwardly and again outwardly to form an inwardly disposed corrugation, and then disposed downwardly and inwardly and then horizontally outward and terminating in an upwardly disposed vertical portion located in the plane of the downwardly disposed vertical portion. A second plate has a horizontal forwardly disposed portion connected to the downwardly and inwardly disposed portion of the first-named plate and to the upper end of the upwardly disposed vertical portion of it, then being disposed vertically upward in the plane of the vertical portions of the first-named plate and connected to it at its upper end. The intermediate portion of the plate is bent inwardly and then outwardly forming an inwardly disposed corrugation, while end walls connected to opposite ends of the plates form an elongated hollow shell of triangular cross-section with a horizontal partition dividing the hollow shell into two chambers, and means for circulating a cooling fluid through each chamber.—2,956,522.

Apparatus and Method of Making Moulds

A moulding machine has a hydrostatic container closed at the bottom and open at its top; a flexible diaphragm closing the open top of the container which has a non-compressible liquid therein below the diaphragm; a cylinder having a piston; a valved duct extending from the container to the cylinder; and means for moving the piston in the cylinder. A flask disposed upon the container is filled with moulding sand; an impact platen above the flask carries the pattern and is adapted to be forcibly depressed into the sand. The machine has a multiple station rotary table adapted to rotate around a central post mounted on a base containing power cylinders for operating the table; and has means for simultaneously moulding a cope mould and a drag mould, the machine having means for rolling over the cope mould onto the drag mould including trunnions fastened to the flask.—2,956,317.

Casting of Metal

In apparatus for casting metal in a continuous length, open-ended metal shaping means having straight side walls travel with the metal being cast. Means separate from the shaping means feed the molten metal between straight walls directly to the metal shaping means substantially without turbulence and in the final cross-sectional shape and with a straight axis identical with that of the metal shaping means for a substantial distance in the direction of casting. Means provide for varying the spacing of

the shaping means and feeding means, and means for interposing through the spacing a thickness of travelling dressing medium between the sidewall of the shaping means and the metal so that the thickness is controlled in correspondence with the spacing, the side walls and dressing medium travelling in unison with the metal being cast.—2,956,320.

Vents for Centrifugal Casting Moulds

A centrifugal casting mould comprises a hollow substantially cylindrical body having a vent hole extending in a substantially radial direction from the inner surface to the outer surface of the mould body for permitting the escape of gas from the interior of the mould body during the casting operation. A core member in the vent hole is so supported therein as to resist movement axially of the hole while being capable of rotation therewithin, the core member being of less cross-sectional area than the vent hole and co-operating therewith to form a plurality of restricted venting passageways through which gases may escape outwardly from the interior of the mould body, the core member being so shaped that rotation thereof scours the wall of the vent hole.—2,956,322.

Rotary Fluid-cooled Flame Head for Flame-hardening Machine

A flame-hardening machine has a flame head having three concentric connecting bores of successively diminishing size; an axle comprising an outer conduit having one end tightly received in the largest bore, an intermediate conduit within the outer conduit having one end tightly received in the intermediate bore, the intermediate conduit being spaced from the outer conduit to define a fuel passage between them and an inner conduit within the intermediate conduit having one end loosely received in the smallest bore, the inner conduit being spaced from the intermediate conduit to define a coolant discharge passage therebetween. Flame ports in the flame head communicate with the fuel passage in the axle, while a coolant passage through the flame head has one end in communication with the inner conduit of the axle and the other end in communication with the coolant discharge passage in the axle. A first fitting at the other end of the outer conduit has a fuel port in communication with the fuel passage in the axle, the outer and intermediate conduits being rotatable relative to the first fitting and intermediate and inner conduits extending through the first fitting. A second fitting at the other end of the intermediate conduit has a coolant discharge port in communication with the coolant discharge passage in the axle, the intermediate conduit being rotatable relative to the second fitting and the inner conduit extending through the second fitting. A fuel supply conduit is connected to the fuel port; a coolant discharge conduit is connected to coolant discharge port; and a coolant supply conduit is connected to the inner conduit. Means rotate the outer conduit; and shift the outer conduit axially.—2,956,793.

Method and Means for Blowing Gases Containing Possibly Pulverulent Material into a Bath of Molten Metal

An arrangement for blowing a gaseous stream into a bath of molten metal, comprises a ladle provided with an opening in its bottom, a nozzle of refractory material fitted in the opening in the bottom a stopper plug of refractory material having a specific gravity lower than that of the molten metal adapted to engage in contacting relationship the end of the nozzle facing the inside of the ladle. An elongated metal member extends through the nozzle and is connected with the plug. Means outside the ladle and outside the nozzle are adapted to secure the removably elongated member to the lower end of the ladle, the release of the elongated member allowing it to rise together with the stopper plug inside the metal bath. A connection opening into the nozzle is adapted to feed the gaseous stream through the latter into the metal bath inside the ladle.—2,956,794.

Computers and Creep

AT the Iron and Steel Institute's annual general meeting, to be held in London on May 3 and 4, there will be technical sessions devoted to the use of computers in the iron and steel industry and to the Brymbo oxygen steelmaking process. At the same time, a joint symposium with the Institute of Metals on structural processes in creep will be held. Sir Charles Goodeve, FRS, director of the British Iron and Steel Research Association, will take office as president of the institute and will deliver his presidential address on the morning of May 3. He will take the chair at the annual dinner for members at Grosvenor House, Park Lane, that evening.

The formal business and the sessions on computers (which will be under the ægis of the British Conference on Automation and Computation) and oxygen steelmaking will take place at the Institution of Mechanical Engineers, Birdcage Walk, S.W.1. The joint symposium on creep will be held at the Hoare Memorial Hall, Church House, S.W.1.

BHP Developments

NEW four-stand high-speed rod mill which is to replace the present two-stand mill at the Newcastle (NSW) works of the Broken Hill Proprietary Company, Limited, will eventually produce more than sufficient for Australian requirements. Announcing this, Mr. C. Y. Syme, chairman of the company, said that Port Kembla would then be relieved of the need to roll rods and could possibly attain a higher output of merchant bars. The overall development programme will make Whyalla (South Australia) into a centre of steelmaking. Initial installations comprise two LD furnaces, a primary rolling mill, and a structural steel mill, all estimated to cost £41,000,000.

The LD process is to be extended to all four open-hearth furnaces at Port Kembla. Two LD furnaces will be built at Whyalla. Pilot-plant work has continued on the recovery of blast-furnace feed from ironbearing jaspilites at Iron Monarch and in the Middleback Ranges of South Australia. The company has little doubt that the material has economic potential, although some time must elapse before it can be treated on a commercial scale. In the meantime, the recovery of residual material, known as scree ore, at Iron Monarch is to be undertaken.

Pilot Contact Tube Modification

MODIFICATION to the pilot tube in a BS 100-amp. coal-cutter plug, which enables an electrician to make a coal-cutter trailing cable inoperative when the cable has been condemned for further use until it can be repaired, has been invented by Mr. R. W. Calder, an electrician at Bates Colliery, in the Northern (N & C) Division of the National Coal Board. This device saves the electrician's time in making a damaged cable unusable by the standard method of cutting off the BS plugs, saves wastage of cable, and eliminates a source of danger.

A normal contact tube is modified by cutting and removing $\frac{1}{4}$ in. of the tube, and replacing this portion by an insulating washer (No. 9 in the diagram). The tube comprises a first portion (1) securable to the core of a trailing cable (not shown) by means of grub screws (2) which engage the cable core when it is inserted in the axial core (3) in the first portion, and a second portion (4) engageable with a mating contact (not shown) normally situated at a gate-end box.

The second portion is generally similar in construction to the free end of the usual form contact tube, except that it is provided with an axially extending clearance hole (5) suitably countersunk at (6) to allow the passage of the shank of a screw (7) of a type to enable the shank to be screwed into a correspondingly threaded axial hole (8) in the first portion.

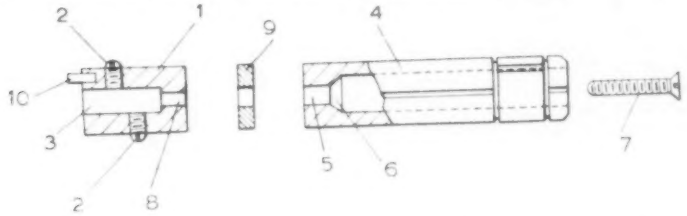

DIAGRAM SHOWING THE MODIFICATION TO A NORMAL CONTACT TUBE.

The two portions with the insulated washer inserted between them are thus screwed together, with electrical contact between the portions maintained by means of the screw. The spigot (10) engages in the keeper piece (not shown) of the main insulator of the plug to prevent rotation of the first portion during screwing or unscrewing of the screw (7).

By removing the screw an electrician can isolate the pilot contact tube and so render the cable unusable. If the cable were inadvertently reconnected to a gate-end box it would not be possible to energize the cable, and a potentially dangerous incident would thus be averted.

PREPARATIONS FOR WORKING the large iron-ore deposits present at Svappavaara in Lapland are to be started by the Luossavaara Company. Extraction will be from open workings.

Leeds University Mining Society

TECHNICAL papers in Volume 36 (1960) of the Journal of Leeds University Mining Society deal largely with the hydraulic extraction of coal. Dr. P. H. Broadhurst, senior development engineer, Central Engineering Establishment, National Coal Board, reviews the progress made in countries where the techniques are being applied. In a further paper, Dr. Broadhurst and Mr. R. Crosland, assistant engineer, Central Engineering Establishment, discuss the development of high-power water jets for the winning of coal underground and describe the trials carried out at the Trelewis drift mine in the South-Western Division.

The methods of feeding coal into hydraulic transport lines and the work carried out by the CEE in co-operation with the hydraulic transport section of the NCB are summarized in another paper by Dr. Broadhurst and Mr. R. W. Read, assistant engineer of the CEE. It also describes the testing and designing of several lock hopper-type feeders and the manufacture, installation, and testing of the prototype feeder operating at Woodend Colliery, West Lothian.

Significant changes in underground blasting techniques which have taken place during the last 10 years are described in a paper by Mr. K. Howard, assistant explosives engineer, North-Eastern Divisional Coal Board.

War-blinded Workers in Industry

"BLIND workers are now firmly established in industry. They put in the same number of hours for the same pay as a sighted operative. Their work compares favourably with his in both quality and quantity and, perhaps, best of all, they have been proved by experience to be no more accident prone than anyone else." This confident statement is made in St. Dunstan's annual report entitled "The Aim is Independence."

The organization was a pioneer in the employment of the blind in industry and the report tells something of those early days. The demand for factory labour to replace manpower released for service in the Forces during the second world war, created the opportunity for St. Dunstan's men to enter industry on the shop floor. But they were not placed in this kind of employment until they had first thoroughly mastered, in the workshops at St. Dunstan's, the type of machine they would later operate in the factory to which they were going.

Copies of the report and other information may be obtained from St. Dunstan's, 1, South Audley Street, London, W.1.

PROGRESS IN MINE SAFETY

—*Since 1855*

EXTRACTS from reports of Inspectors of Coal Mines, presented to HM Secretary of State in 1855, published in the December 10, 1960, issue of the Science and Art of Mining, under the title "100 Years of Education and Training," by Mr. A. B. Wilkinson, head of the Department of Mining and Geology, Wigan Mining and Technical College, reveal in stark reality the progress that has been made in mine safety, education, and training down the years.

The reports of the early Inspectors, read in the light of present legislation and mining practice, outline vividly the human suffering that has produced the extensive legislation of modern mining. The value of Part VIII of the Mines and Quarries Act, 1954, prohibiting the employment below ground of women and young children and other parts and sections of the Act is fully appreciated when the following reports are read.

"The deceased, who was only 12 years old, attended an engine which drew the coals and workmen, and pumped water. To work the gear he stood on a narrow and unfenced stage, placed in such a position that a slip of the foot would precipitate him upon the shafting. He seems to have stumbled against the crank, and his mangled body was found between the flywheel and the walling. The boy had been six months at this occupation and received 4s. a week for his services."

Other facets relevant to safety in mining are emphasized by further examination of the 1855 reports.

"In this case a man was drawn over the pit-pulley. The deceased was employed underground during the night; a boy 16 years old worked the winding engine, which stood at a distance of 120 yd. from the pit; the night was dark, the fires on the pit-bank were extinguished, and no banksman was in attendance. There was not any bell or other apparatus to convey signals from the pit to the engineer, but the men at the bottom of the shaft shouted to him, and in drawing them up he depended on catching a glimpse of a mark on the rope to indicate when the load approached the top.

"In this way the pit had been worked at night for a period of three months. On this fatal occasion the engine boy lost sight of the mark on the pit-rope, and the unfortunate deceased was hauled over the pulley and killed."

Perusal of the extracts from the reports provide evidence of a serious attempt to introduce Rules and Regulations towards safety; for example, the appointment of overmen, the pre-examination of working places, the use of safety lamps, prohibition of riding on tubs, sufficient supply of timber, signals to be provided for shafts, the appointment of banksmen and onsetters, daily examination of machinery, and many other items.

Rock-dusting to Prevent Explosions Underground

NEW standards for rock-dusting to prevent explosions of bituminous coal and lignite dust in underground mines have been approved by the Bureau of Mines and the American Standards Association, the US Department of the Interior announces. A study, sponsored by the bureau and carried out by an ASA committee, revealed that former rock-dusting standards, adopted originally in 1925, had become largely obsolete because of increased mechanization and other advancements in coal mining.

The new standards prescribe how rock dust (powdered limestone) should be applied for maximum effectiveness and how rock-dusted areas should be sampled. They also contain a section defining rock-dusting terms and include an appendix describing a suggested laboratory method for testing the caking tendency of rock dust. The new standards can be obtained in the Bureau of Mines Information Circular 8001, "American Standard Practice for Rock-dusting Underground Bituminous-coal and Lignite Mines to Prevent Coal-dust Explosions (ASA Standard M13.1-1960, UDC 622.81)," from the Publications-Distribution Section, Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa.

Book Review

Coal Mines and Miners. By Miles Tomalin. 79 pp. Methuen & Company, Limited, 36, Essex Street, Strand, London, W.C.2. 10s. 6d.

MR. TOMALIN has obviously enjoyed himself while working on the production of this book, which is in the Methuen's Outlines series. Those of us who are familiar with this series will know at once, of course, that "Coal Mines and Miners" is not intended for the mining expert (although he would surely enjoy reading it). It is really designed to appeal (and to educate, or, at any rate, inform) the junior reader, and its inclusion in the junior sections of public libraries and in school libraries is strongly advocated.

The author, who visited many collieries while gathering material for the book, describes the development of mining methods and the conditions under which miners have worked and lived, from the earliest times down to the present era of nationalized mining. Much of the historical information he has collected is otherwise accessible only in rare books. The illustrations, of which there are many, have been chosen carefully and they are most attractive.

The value of the book is enhanced by the inclusion of a select book list. And having read "Coal Mines and Miners" it is likely that many young and not so young readers will pursue their study of the subject.

Coal Stocks in Europe

LIFTING OF 7,000,000 TONS THIS QUARTER

LIFTINGS from pithead coal stocks in Europe are expected to total 7,000,000 tons during the first quarter of 1961, the Coal Trade Sub-Committee of the Economic Commission for Europe reported at its quarterly meeting in Geneva recently. Reductions in pithead stocks are expected in the United Kingdom, Western Germany, France, Belgium, and the Netherlands, and as a result of various measures being taken, current availabilities (production and imports) and demand are coming more closely into balance.

Forecasts drawn up by governments showed that demand for coal in Europe is expected to remain virtually unchanged compared with the corresponding quarter of 1960, although there will be normal seasonal increases compared with the last quarter of 1960. Expansion in the demand for coal in coke ovens experienced in 1960 is now flattening out, since in nearly all countries the steel industry is working at capacity. In the power stations, a significant increase compared with the same quarter last year is expected only in the UK, as on the continental output of hydro-electricity has increased.

The sub-committee reported that in recent weeks the rundown in manpower in the mines in Europe, which had assumed serious proportions in the earlier part of last year, had slackened. It was also reported that tonnages in stock at pithead in Europe now include only very small quantities of graded anthracite, but that there would probably be no serious difficulty in ensuring supplies of solid fuels for domestic purposes during the winter.

ECSC's Forecast

The High Authority of the European Coal and Steel Community in its forecast for the first quarter of 1961 expects the improvement in market conditions apparent in the last weeks of 1960 to continue. Demand is estimated as 55,000,000 metric tons, as compared with 55,600,000 tons for the first quarter of 1960. Household demand is expected to increase but power stations are likely to use less since they are using up stocks. Total coal disposals during the period are likely to be about 64,300,000 (64,500,000) tons.

Hard coal output for the first quarter is set at 59,200,000 (60,900,000) tons and with imports expected to increase from 4,000,000 to 4,300,000 tons, a total of 63,500,000 (64,900,000) tons will be available. This means that there will be a surplus in demand of 800,000 tons compared with a corresponding 1960 surplus of 400,000 tons. This may make it possible to reduce stocks to 28,200,000 tons by the end of March, 1961, compared with an estimated 29,000,000 tons at the end of 1960.

PRESENTATION was made last Friday to Mr. Fred Ward on his retirement after 50 years with the Bowsfield Steel Company, Limited. Starting with the company as a boy, he became foreman stocktaker in charge of the sheet metal department.

£3,000,000 Pits Development in Rhymney Valley Area

ABOUT £3,000,000 is expected to be spent on reconstruction and development this year in the Rhymney Valley Area of the South-Western Divisional Coal Board, said Mr. George Tomkins, Area general manager, last week. Large strides had been made last year in the use of power loaders, and 10 more machines are to be installed this year, bringing the total to 32. This will mean that 50 per cent. of the Area's output will be obtained from fully mechanized coal faces.

Mr. Tomkins said that coal was being rapidly raised from stocks in the Area. During the past year 191,000 tons were recovered from ground stocks, and the present rate of recovery was 5,000 tons a week. Weekly manpower losses at the end of 1960 were at their lowest level for more than a year, and recruitment figures were most encouraging, although there were immediate jobs available for 2,000 men. There was a growing realization, he said, that the mining industry was able to offer security of employment.

INDIAN COAL INDUSTRY SEEKS GOVERNMENT AID

COAL industry in India has submitted plans to the Government urging immediate assistance to improve its mining techniques to enable it to reach its third plan target output of 62,000,000 tons. Expenditure of Rs. 600,000,000 is envisaged in the plan, about half of which will be in foreign exchange to cover imports of machinery and spare parts from abroad.

The plans also form the basis of discussion between industry and a three-member World Bank team now visiting India to assess the country's requirements of foreign exchange for certain projects during the third year plan.

Over the first three quarters of last year about 37,900,000 metric tons of coal were produced in India, against 35,900,000 tons in the corresponding period of 1959.

MANUFACTURERS of business imprinting machines and systems, the Adrema, Limited, group, London, W.3, has acquired a sixth building at Westway Trading Estate, Acton, London, W.3.

Appointments

West Midlands Division Colliery Posts

MR. L. KING has been appointed assistant manager of Hamstead Colliery in the South Staffs and Shropshire Area of the West Midlands Divisional Coal Board. He has been assistant manager at Highley Colliery in the same Area for the past three years. Prior to this he had experience in the Durham coalfield, before wartime service with the RAF, and after the war at various collieries in the East Midlands Division. For the last two and a half years of his service in the East Midlands Division he was under-manager at Calverton Colliery.

Mr. W. H. MOUNTFORD has been appointed by the board to the post of electrical engineer at Apedale and Glasshouse collieries, North Staffs Area. He has served in the industry for 20 years—18 years at Victoria Colliery and the last two at Hem Heath Colliery, where he was assistant electrical engineer.

Mr. F. R. A. MORRIS, head of the department of Engineering at Carlisle Technical College, has been appointed principal of Dumfries Technical College.

Mr. E. SMITH has been appointed works manager of Precision Machinery Services, Limited, a subsidiary of Modern Machine Tools, Limited, Coventry.

Mr. STANLEY HECTOR HOOPER has been appointed secretary of Rubery Owen (Warrington), Limited, in succession to Mr. E. F. Edwards, who has retired.

Mr. F. D. WILLIAMSON has succeeded Mr. W. J. W. PATON as publicity officer in the public relations department of the Cementation, Limited, group of companies.

Mr. R. W. CORNISH has been appointed office administrator of the new factory which is to be built near Irvine (Ayrshire), by the Skefko Ball Bearing Company, Limited.

Following Mr. T. H. B. Whiting's appointment to the board of Aveling-Barford, Limited, Mr. R. O. MACGOWAN has succeeded him as manager, spares and service department.

The industrial division of S. Smith & Sons (England), Limited, has appointed Mr. HAYDN HOLLYMAN as area representative for the Midlands, to replace the late Mr. V. P. Scholes. He will be responsible for the sales of boilerhouse and process control instrumentation in the counties of Leicester, Stafford, Shropshire, Derby, the Birmingham area and Mid-Wales.

Non-ferrous Metals Consumption Rises

CONSUMPTION of copper, tin, lead, and zinc increased in the UK in November, according to advance figures issued by the British Bureau of Non-Ferrous Metal Statistics. Consumption of copper during the month totalled 68,168 tons, compared with 62,372 tons in October, and that of tin rose to 2,164 tons from 1,961 tons (revised) in October. Lead consumption in November totalled 33,541 tons, compared with 32,680 tons in October, while zinc consumption rose to 32,598 tons from the October figure of 30,598 tons.

Stocks of copper totalled 115,305 tons at the end of November, compared with 118,033 tons in the previous month, and tin stocks were 11,366 tons compared with the revised October total of 11,237 tons.

New Steel Output Record by UK in 1960

STEEL production in the UK in 1960 reached a new record level of 24,305,000 tons, an increase of 20 per cent. above the total for 1959 and 12 per cent. above the previous highest annual figure reached in 1957, reports the Iron and Steel Board. Output in December was at an average rate of 451,000 tons a week, 4 per cent. higher than the previous best December figures.

Pig-iron production, at 306,000 tons a week, was also a record for the month of December. Total production for the year at 15,763,000 tons was 25 per cent. above the 1959 total and 10 per cent. above the previous record reached in 1957.

Latest pig-iron and steel output figures (in tons) with the corresponding 1959 returns are shown in the following table:—

Period.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1960—October ..	313,000	16,321,000	497,000	25,842,000
November ..	315,000	16,352,000	504,500	26,234,000
December ..	306,000	15,912,000	451,100	23,459,000
Year	—	15,763,000	—	24,305,000
1959—October ..	269,800	14,029,000	441,400	22,953,000
November ..	277,300	14,422,000	458,600	23,847,000
December ..	280,400	14,583,000	432,900	22,513,000
Year	—	12,582,000	—	20,186,000

Structural Steel Trade Hit by Advances in Concrete

STEEL trade has suffered as a result of developments in the design and quality of concrete, which have resulted in many more structures being designed in this material, states Mr. J. R. Dixon, chairman of the Cleveland Bridge & Engineering Company, Limited, Darlington. Much had been heard of the deterioration of metal structures, and much of the ageless nature of concrete, but he feels that time alone will produce a true picture of their rival claims. "It is well known that steelwork, properly treated in the first case and reasonably maintained, has tremendous durability."

Mr. Dixon, in his annual report to shareholders, says that the volume of work booked during the year 1959-1960 was not as great as he would like, although the tonnage of steelwork was not far short of a year's output. There was a reasonable amount of work in hand, and there should be no slowing down in the works for at least 18 months.

FRENCH STEEL OUTPUT RISES TO 17,200,000 TONS

IT is estimated that 1960 French steel production was 17,200,000 metric tons, a rise of 13 per cent. over the 1959 figure of 15,200,000 tons. About 1,700,000,000 frs. was spent on steel industry expansion in France last year, some 30 per cent. more than in 1959.

Steel orders from inland consumers were up by 10 per cent., and there was a 12 per cent. rise in demand from other consumers in the European Coal and Steel Community. Oversea demand was 17 per cent. higher.

IRON AND STEEL TRADE

REFERENCE by a number of chairmen of steel companies to inflationary tendencies outside the industry's control which are affecting price structures has cast a slight shadow over the bright prospects of the industry. For the most part warnings which have been given are long-term—an example is that given by Sir Ellis Hunter, chairman and managing director of Dorman, Long & Company, Limited, on the likely effects of the new rating proposals—but they certainly cannot be ignored.

Pig-iron

There is no general falling off in the recent high level of pig-iron production, the steelworks keeping up their demand for the major part of the basic pig-iron output and the ironfoundries are well placed for supplies in all grades. The heaviest demand is for the low phosphorus irons and, although production of one or two brands is limited, overall outputs from the several furnaces producing this type of iron are adequate to meet present demand.

There is no difficulty in getting full requirements of the high phosphorus irons and producers have tonnages to spare from both current output and stocks. More could be disposed of oversea were it not for the fierce competition from makers abroad.

Ferro-alloys

There has been a slight reduction in the price of ferro-tungsten which now stands at 11s. 6d. per lb. W. contained. Tungsten metal powder is similarly reduced to 14s. 6d. per lb. There is a steady call on ferro-tungsten, while ferro-vanadium and ferro-molybdenum are fairly active. Both the low and high carbon grades of ferro-chrome continue to receive attention, and ferro-silicon maintains its active position. In more specialized directions certain consumers continue to favour ferro-phosphorus and ferro-sulphide. The demand for ferro-manganese and silico-manganese is at an interesting level, the former having undergone a reduction of £3 per ton.

Semi-finished Steel

It is generally reported that the excessive pressure for the products of the re-rollers has eased slightly, but the mills are still busily occupied on small steel bars and light sections and there has been little or no slackening in the call for reinforcing rods.

Most of the re-rollers have good stocks of mild steel semis and can obtain early delivery of any replenishments required, but the difficulty in obtaining sufficient tonnages of carbon and alloy steel billets shows no sign of improving. The mills are taking up all arisings at the steelworks of suitable defectives and crops.

Finished Steel

One reason for the demand for sections and joists being below the normal high level would seem to be customers' present preoccupation with stocktaking, but except for special sizes where additional tonnage can be accepted to make up adequate rollings, it is still "extended delivery" for most business. Until output from new plant reaches its top level, makers will continue to have difficulty in holding to delivery schedules for all kinds of plate, but cold reduced sheets in normal dimensions are easier to obtain.

Further tonnage of hot rolled strip and black sheets could be accommodated and brisker business in cold rolled strip, good commercial quality bright drawn bars, and flat and corrugated galvanized sheets would not come amiss.

GEC to Supply £1,000,000 Ore Plants

TWO ore-handling plants have recently been ordered from the General Electric Company, Limited. One, worth £1,000,000, is to be installed at the Scunthorpe South Works of the Appleby-Frodingham Steel Company, branch of the United Steel Companies, Limited, while the other, worth £500,000, is for the Ravenscraig works of Colvilles, Limited.

The Appleby-Frodingham plant, which was ordered through Head Wrightson Iron & Steel Works Engineering, Limited, consists of an 8-bed blending plant and about 15,000 ft. of conveying equipment for the sinter plant. This new installation supplements the original plants supplied by GEC and commissioned in 1950 and 1954.

The blending plant will include three reclaiming machines—one of which is to be a standby unit—four double-wing stackers, and a transfer car. The eight beds will have a total storage capacity of 55,500 tons of ore, which can be reclaimed by the two machines at a rate of 700 t.p.h. Each double-wing stacker has a stocking-out capacity of 735 t.p.h.

One of the three orders covering the ore-handling plant for Ravenscraig is for stockyard extensions and modifications including a 170-ft. span stocking-out bridge and two double-rotor plough feeders. The feeders are of a new design, each capable of handling 1,500 tons of ore per hour. The other orders are for conveying equipment for a sinter plant, placed through Head Wrightson Iron & Steel Works Engineering, and a limestone and lime-handling plant for which Priest Furnaces, Limited, is the main contractor. The latter order covers conveyors, storage bunkers, and crushing facilities which will be used to supply an LD steel-making plant.

New Plate Mill for Colvilles

ONE of the most important contracts on which Davy & United Engineering Company, Limited, is engaged at the moment is the building of a new 39 in. and 60 in. by 132 in. 4-high plate mill for the Clydebridge Steelworks, Cambuslang, of Colvilles, Limited. The value of the contract exceeds £1,250,000. The new mill will roll slabs 35 in. to 54 in. wide, 6 ft. to 10 ft. long, and weighing up to 10 tons, to produce steel plate 120 in. wide and up to 90 ft. long. The mill will be driven by twin 5,000 h.p. motors which will give rolling speeds up to 1,020 ft. per minute.

This latest order brings the total value of contracts on which Davy & United Engineering is now engaged for Colvilles to approximately £7,500,000.

Coalfield News

Montagu Colliery Spirit Lives On

LAST of the Newcastle-upon-Tyne pits, Montagu Colliery, ceased production in 1959, but that has made no difference to the social welfare work of the pit's NUM lodge on behalf of retired miners and their families.

Presenting long-service certificates to Mr. James Nesbitt (63) and Mr. George Poll (64), who each had 50 years' service with the colliery, Mr. E. W. Potts, general manager of the South Northumberland Area, Northern (N&C) Divisional Coal Board, said: "Montagu can be said to have passed out gloriously, and its spirit still lives in the men who are now working elsewhere."

TOTAL of the Six Bells Colliery Disaster Fund has now reached almost £102,000.

SPECIALLY COMMISSIONED film of last year's miners' Gala at Cardiff is to be shown throughout the Welsh mining valleys to help popularize this year's event.

COAL AND COKE shipments from the South Wales ports last week totalled 56,851 tons, compared with 60,716 tons in the corresponding week a year ago.

THREE SOUTH YORKSHIRE colliery bands, Markham Main, Wharncliffe Silkstone, and Dinnington, will be among 16 northern bands competing in a new knock-out brass band competition, sponsored by the BBC.

PROPOSAL BY Glasgow Corporation to build 7,000 houses at Summerston has received a setback by the National Coal Board's decision to use Garscube Colliery for the extraction of coal over a wide area north of Maryhill to the city boundary.

COAL SHIPMENTS from Blyth (Northumberland) during 1960 amounted to 5,567,283 tons of which 4,875,909 tons were shipped coastwise, and 691,374 tons exported. Shipments from Seaham (Co. Durham) fell by 250,000 tons to 1,250,000 tons for the year.

ANNUAL ELECTIONS of the Yorkshire area of the National Association of Colliery Overmen, Deputies, and Shotfirers are being contested by 45 men. The results will be announced at the annual general meeting of the area council at Barnsley on January 28.

AYRSHIRE PIT CLERKS are to demand of the TUC disciplinary measures against the "white collar" section of the NUM for pursuing a wages policy which they believe has led to NCB clerical workers becoming some of the lowest paid office workers in the country.

CLAIMING that they are the "forgotten" men of the industry, 80 electricians and mechanics at Ormonde Colliery (Derbyshire), who are demanding an increase of £5 a week, have rejected appeals by their union officials and have called a 48-hour token strike for Monday.

BECAUSE of the poor response to its appeal for 7,000 former miners to return to the industry, the Scottish Divisional Coal Board is to resume its youth training scheme at a number of collieries. Volunteers began training at Kingshill No. 1 Colliery (Lanarkshire) this week.

ALDWARKE MAIN COLLIERY, near Rotherham, is to close in July, because of seam exhaustion. It had originally been intended to keep the pit working for another three or four years. The pit is about 96 years old and, at its production peak employed 1,509 men, producing 10,000 tons of coal a week.

VACANCIES FOR UP to 60 men for training as underground workers exist at the Point of Ayr Colliery (Flint), states Mr. H. L. Braithwaite, manager of the Holywell Employment Exchange. The National Coal Board has dispelled any fears regarding the duration of employment at this modern and mechanized pit, he says.

VERDICT OF ACCIDENTAL DEATH was returned at the Rotherham inquest on Mr. Colin Clark (41), who died after receiving injuries when he was trapped by a coalcutter at Silverwood Colliery. The accident took place during the repair of a ventura tube, and the coroner, Mr. C. L. Blenkinsop, commented: "No one emerges from this affair with any great credit except the first-aid men."

RECORD overall productivity of 26.6 cwt. per manshift was achieved in the Northern (N&C) Divisional Coal Board in 1960, compared with 25.9 cwt. in 1959. At the face, productivity was a record 79 (73.8) cwt. per manshift. In the adjoining Durham Division overall productivity during 1960 increased to 22.14 cwt. from 21.46 cwt., while faceworkers averaged 64.68 (62.85) cwt. per manshift.

Two Northumberland checkweighmen, Mr. William Johnson (Bedlington Colliery), and Mr. Mark Cowell (Cambois Colliery), each received a cheque for £200 on their retirement last week. The gifts followed the recent decision of the Ashington Miners' Checkweigh Fund to pay retiring veterans an amount equivalent to that which they would receive on retirement if they were employed by the National Coal Board.

"FIRST I want to get to know the people in the industry in the division. Then I will absorb the two key problems of marketing and production as quickly as possible. I obviously want to get the feel of the coalfield, but basically the problems are very similar to those facing the Durham coalfield," said Mr. A. H. Kellett, new chairman of the South-Western Divisional Coal Board, on his first full day at the board's Cardiff headquarters last week.

Mr. WILLIAM DAVIES, deputy at Nos 3 and 4 Pits, Fallin (Stirlingshire) has retired after more than 50 years in the coal industry. He began work at Fallin Pit at the age of 14, and served in all grades underground up to oversman and deputy. He was an overman for 34 years, and a deputy for the last seven, and during his career served under 14 managers.

PRELIMINARY FIGURES indicate that coal shipments from the River Wear during 1960 rose by 5,000 tons to 2,200,000 tons. Foreign coal shipments rose from 200,000 tons to 350,000 tons. Mr. S. J. Adamson, chairman of the River Wear Commissioners, announcing this, said that the coal industry was the mainstay of the Wear's trade.

SAFETY DRIVE IN YORKSHIRE COALFIELD REWARDING

EFFECT of the safety campaign in the Yorkshire coalfield during 1960 is reflected in the figures for fatal and serious accidents last year, which fell to a record low level. Throughout the coalfield there were 22 fewer deaths and 17 fewer seriously injured than in 1959, the figures being 46 killed (against 68) and 264 seriously hurt, compared with 281.

During the campaign letters were sent to the 120,000 Yorkshire miners appealing for them to take more precautions. Criticism was made of the number of transport accidents both above and below ground, and during the past year there was a considerable reduction in this type of accident. Divisional officials are still concerned, however, at the high percentage of accidents due to roof falls, which accounts for more than a third of the deaths and 99 of the serious injuries.

THE COAL TRADE

MARKET in industrial fuels continues brisk and although, for the most part, supplies are adequate to meet all needs, there are some delays in getting supplies away from the pithead. However, it appears that most of the larger concerns have sufficient stocks to see them through a crisis, but they are anxious to replenish stocks to avoid any breakdown in heating and power. The domestic demand continues to vary, especially the further one gets from the source of supply. A steady call with no sense of urgency occurs in the Midlands, but in the south the situation is fraught with some desperation on the part of customers—and merchants who anxiously await the arrival of supplies by rail.

SOUTH WEST LANCASHIRE

Following a quiet start to the New Year the demand for house coals shows a considerable increase owing to the colder weather conditions. Merchants are receiving a steady flow of orders and are able to deal with them fairly promptly. Supplies of house coals are now coming forward more regularly and the daily deliveries to the depots have shown a steady improvement, while depot stocks are still being held fairly well intact. The demand, in many cases, shows a trend towards the cheaper grades of fuel, particularly group 6, but there is not sufficient tonnage of group 6 available in large coal or cobbles and merchants are having to distribute a considerable amount of doubles. The increased demand for smokeless fuels, particularly Coalite, continues and although supplies are insufficient for present needs they are coming forward very regularly. Anthracite nuts are very scarce and the south Wales small boiler nuts have dropped seriously into arrears. These shortages are being covered, to some extent, by Phurnacite and small coke nuts.

The gas coke market continues to operate at the higher levels recently reached and there is an insistent demand for domestic and central heating purposes in addition to the general industrial requirements which have remained at a very good level for a considerable period. Supplies both by road and rail transport continue to be satisfactory. In the general industrial market the demand for all types of steam raising fuels remains consistent and deliveries from the collieries are keeping up to the allocated tonnages.

Coastwise trading from the Merseyside docks shows little change and continues on the very much reduced level of recent months. There is, however, a good demand for house coals from Northern Ireland and the Isle of Man.

The average prices per ton of house coal now in force are as follows:—Group 1, 212s. 8d.; Group 2, 193s. 3d.; Group 3, 176s. 5d.; Group 4, 164s. 8d.; Group 5, 151s. 7d.; Group 6, 141s. 5d.; Group 7, 127s.

SOUTH WALES

Swansea—With winter setting in with a vengeance, demand is strong for all grades of coal. The domestic sector is facing the annual difficulty of trying to reconcile supply and demand and despite the fact that merchants continue to draw heavily on their diminishing stocks, there is a considerable delay before orders are fulfilled. The call for manufactured fuels has increased considerably and supplies of Phurnacite and Coalite in particular are tending to drop to dangerously inadequate levels. Supplies under the small anthracite supply scheme continue to fall far short of demand.

The industrial sector of the market continues on the high level of last year. The iron and steel industry maintains a high level of consumption and the coke ovens are taking more coal than for some years past. Supplying industry with its fuel needs presents little problem so far as the availability of coal is concerned, but transport delays are frequent and tend to delay deliveries.

51,000 Fewer Men in the Mines

TOTAL saleable output of coal in the week ended January 7, 1961, was 3,353,100 tons, compared with 4,022,900 tons in the week ended January 9, 1960. There were 582,950 workers on colliery books in the last week of 1960, compared with 633,990 a year ago. Of these 220,570 (243,780) were face workers. Total inland consumption of coal in the week ended December 31, 1960, was 3,785,000 tons, compared with 3,887,000 tons in the corresponding week a year earlier. Exports showed a decline due to the holidays and at 64,000 tons compared with the previous year's figure of 98,000 tons.

There were 582,950 wage-earners on colliery books on December 31, against 633,990 on January 2, 1960, the numbers engaged at the coal face being 220,570 and 243,780 respectively. Total absenteeism (all workers) in the week ended December 31, was 21.12 per cent., compared with 22.55 per cent. in the week ended January 2, 1960. Output at the face was 3,933 tons and overall 1,299 tons in the week ended December 31; compared with 3,900 and 1,317 tons in the week ended January 2.

The following table gives (in tons) the revised output of saleable mined coal by division in the week ended December 31, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended December 31, 1960.		Week ended January 2, 1960.
	Total output.	Tonnage lost.	Total output.
Scottish ..	340,800	2,000	219,500
Northern (N&C) ..	186,600	56,400	173,300
Durham ..	318,100	114,900	347,900
North-Eastern ..	387,400	358,800	549,600
North-Western ..	143,600	96,300	182,700
East Midlands ..	449,200	375,900	745,900
West Midlands ..	151,200	119,800	263,100
South-Western ..	188,300	160,000	370,100
South-Eastern ..	15,100	12,400	26,200
Great Britain—			
Deep-mined coal ..	2,180,300	1,296,500	2,878,300
Other deep-mined (including licensed mines) ..	26,200	—	53,900
Open-cast coal ..	68,200	—	98,000
TOTAL	2,274,700	1,296,500	3,030,200

Board Changes

RADIATION, LIMITED—Mr. S. J. Stanbrook has been elected a director.

HICK, HARGREAVES & COMPANY, LIMITED—Mr. Harold B. Finch has joined the board.

BENFORD, LIMITED—Mr. W. P. Webb, general manager, has been appointed to the board.

STEWARTS AND LLOYDS OF SOUTH AFRICA, LIMITED—Mr. W. L. Morrison has joined the board.

RAWLPLUG COMPANY, LIMITED—Mr. J. Tweedie Smith and Mr. E. J. Snee have been appointed additional directors.

HALESOWEN STEEL COMPANY, LIMITED—Mr. C. S. Burch has retired as chairman and from the board due to ill-health.

FIRTH CLEVELAND INSTRUMENTS, LIMITED—Mr. Stanley H. Goss has been appointed joint managing director with Mr. L. G. Oxford.

YALE & TOWNE MANUFACTURING COMPANY—Mr. Walter Anderson Galbraith has been appointed sales director of the British materials handling division.

BERALT TIN & WOLFRAM, LIMITED—Sir Christopher L. Bullock has been appointed chairman. He is also a director of the British Metal Corporation, Limited.

J. B. BROADLEY, LIMITED—Mr. J. M. Jackson has been appointed managing director in succession to Mr. J. C. Jackson, who has relinquished that position, but will continue as chairman.

WILLIAM ASQUITH, LIMITED—Mr. J. Atherton has joined the board as director and chief engineer. Mr. A. Johnson is relinquishing his position as chief engineer, but will remain a director and act as consultant.

ENGINEERING COMPONENTS, LIMITED—Mr. E. P. Gower, general manager, and Mr. G. Finch, manager of the Abergavenny works, have been co-opted to the board. Mr. W. W. Halliday has resigned from the board.

PARSONS CHAIN COMPANY, LIMITED—Capt. J. G. Hopcraft has retired as chairman and managing director of the company and of British Wire Products, Limited. He is succeeded by the deputy managing director, Mr. Ronald S. Searle.

ENGLISH DRILLING EQUIPMENT COMPANY, LIMITED—Mr. F. Nicholson, recently of Shell International Petroleum Company, Limited, has been appointed assistant managing director, and Mr. W. H. Pawsey, a director and secretary.

RUSTON-BUCYRUS, LIMITED—Mr. G. E. Savory has been appointed assistant managing director. He has been sales director since 1949. Mr. F. Wildmore, commercial manager since 1951, has joined the board as director and commercial manager.

EARLE, BOURNE & COMPANY, LIMITED—Mr. K. E. West is to be appointed managing director, Mr. J. R. Roby having resigned. Mr. W. S. Davis is to be appointed secretary of Earle, Bourne and Alfred Case & Company, Limited, in place of Mr. F. J. Bindon-Blood who has retired.

HERMAN SMITH, LIMITED—Mr. Michael Herman-Smith has been appointed deputy chairman. Mr. H. J. Elmore, a director, has been appointed managing director of the aircraft and electronics division with full responsibility for the management of the division and the factories at Cinderbank Works, Dudley.

BRITISH ALUMINIUM COMPANY, LIMITED—Permanent Secretary to the Ministry of Supply, Sir William Strath, is to leave the Civil Service to join the board as from February 1. Mr. James Richie, financial director, has resigned from the board and from his other directorships within the group, to take up another appointment.

ENFIELD CABLES, LIMITED—Mr. B. Powell has been appointed chairman in succession to Lord Verulam who has resigned from the board. Mr. D. J. Hastings has joined the board. Lord Verulam is still chairman of the parent company, Enfield Rolling Mills, Limited, of which Mr. W. W. Kee has been made an additional director and Mr. R. J. Smith appointed secretary.

LAURENCE SCOTT & ELECTROMOTORS, LIMITED—Owing to continued ill health Mr. R. Clarke has resigned as marine sales director, after 48 years' service. Mr. J. B. Wormall, formerly industrial sales director, is now sales director. Mr. J. Callf, who was the chief estimator of the marine department, has become marine sales manager and is suceeded by Mr. B. Kidd.

E. BOYDELL & COMPANY, LIMITED—Mr. B. N. Jolly has been appointed managing director to succeed the founder of the company, Mr. E. Boydell, who will remain as chairman. Following the acquisition of the equity of the company some 12 months ago by Winget, Limited, Mr. R. Ducas, chairman of Winget, and Mr. E. F. O. Gascoigne, deputy chairman, are also joining the board.

JOHN BROWN LAND BOILERS, LIMITED—Mr. H. M. Gregory, general manager, works and construction, and Mr. J. D. Williams, chief engineer, have been appointed directors. Sir James M. McNeill and Mr. Tom Mensforth have resigned from the board. Mr. I. M. Graham, who has been appointed a director of and secretary of John Brown (SEND), Limited, is succeeded as chief accountant by Mr. P. B. Low.

PULSOMETER ENGINEERING COMPANY, LIMITED—Mr. Harold T. Collinswood, who became a director in May, has taken over as chairman from Mr. F. B. Duncan. At his own request Mr. Duncan has relinquished the chairmanship so that he may devote more time to other commitments, and he is also to resign from the board and surrender, without compensation, his post as executive director. Sir Charles Key has retired from the board for personal reasons.

GLYNWED TUBES, LIMITED—Mr. F. H. A. Mackrill has retired as managing director on reaching the age limit, but remains on the board. New directors appointed to the boards of subsidiary companies are Mr. D. E. Drake and Mr. P. J. Custis (Wednesbury Tube Company, Limited); Mr. E. J. Skinner (Glynwed Plant, Limited, and Socketex, Limited); Mr. M. Coyne (Hipkiss Bros., Limited); Mr. J. H. Slater (Steelway, Limited); Mr. F. Skinner (Yarwood Ingram & Company, Limited), and Mr. H. E. Amey and Mr. K. J. Gray (Socketex).

Steel Industry Dominant in AEI (Rugby) Order-book

METAL industries predominated in the order-book of the heavy plant division of Associated Electrical Industries (Rugby), Limited, during 1960, states the company's annual review of progress. Orders received during the year for the steel industry alone amounted to about £4,750,000, ranging from electrical equipment for complete hot or cold-strip mills to rod mill and tube mill drives. Business activity in centrifugal compressors and blowers for use in the steel industry continued to increase.

Reviewing machine development, it notes that the year was largely spent in improving existing lines and continuing development work to investigate new materials and methods of production.

The application of research work by Prof. G. F. Rawcliffe of Bristol University has led to improved design of tapped windings on squirrel cage motors, and the first of these new machines will be in commission by February, the report adds.

Orders Placed

£2,250,000 Steel Mills

Contract Goes to Sheffield Consortium

CONTRACT worth more than £2,250,000 to build rolling mills for the new £26,000,000 Tinsley Park works of the English Steel Corporation, Limited, has been awarded to two Sheffield engineering companies. The companies, acting together as a consortium, are Davy & United Engineering Company, Limited, a member of the Davy-Ashmore, Limited, group, and the Brightside Foundry & Engineering Company, Limited, a member of the Brightside Engineering Holdings, Limited, group.

The order covers plant designed primarily for the quantity production of high quality alloy and special carbon steel billets. It consists of a 42 in. by 102 in. blooming and slabbing mill, two 32 in. by 84 in. reversing billet mills, and an extensive range of billet finishing equipment. The new plant, which is expected to be in full operation early in 1963, will increase billet output at English Steel from 130,000 tons to 380,000 tons a year, and will make possible more economic production.

In addition to rolling special steel ingots weighing between 2½ and 5 tons for conversion into billets, the blooming and slabbing mill will also be equipped to roll slab ingots of stainless steel, weighing 10½ tons, to feed the neighbouring hot strip plant of Shepcote Lane Rolling Mills, Limited, in which the English Steel Corporation has an interest through Firth-Vickers Stainless Steels, Limited.

WHAT IS BELIEVED to be the first shipment to Czechoslovakia of British addressing machines since 1945 has been made by Bradma, Limited, one of the Adrema (London), Limited, group.

ELECTRICITY DEPARTMENT of New Zealand has placed a contract with the Aluminium Wire & Cable Company, Limited, Swansea, for 465 miles of steel-cored aluminium bare electrical conductor, worth approximately £250,000.

ASPHALT manufacturing plant worth £32,000 to produce surfacing material for the new £3,000,000 expressway which will pass through Port Elizabeth, Cape Province, South Africa, is to be supplied by Frederick Parker, Limited, makers of engineers' and contractors' plant, etc., of Leicester.

CONTRACT WORTH £2,000,000, for a new oxygen steelmaking plant building, has been given to Wright, Anderson, Limited, by the Consett Iron Company, Limited. Wright Anderson at the moment is completing a £1,500,000 order for Consett Iron consisting of steel-framed buildings for the new 4-high plate mill.

PLANT for converting sea water to fresh has been ordered by the Government of Qatar from George Clark & North-Eastern Marine (Sunderland), Limited. The order is worth £500,000 and the plant will provide 750,000 gallons of fresh water a day. A similar but smaller plant was supplied by the company last year at Doha.

UNITED ARAB REPUBLIC has retained Andrew Crookson & Company, Limited, consulting engineers, of London, S.W.1, to advise on the use of hydro-electric power from the Aswan High Dam. The contract, worth £55,000, calls for the UK company to provide "feasibility reports" on the possibility of establishing nine different industries ranging from phosphates to steel.

WHAT IS BELIEVED to be the largest type of plate bending and flanging machine in the world is to be supplied by Hugh Smith (Glasgow), Limited, to a new shipyard being built by the Gotaverken shipbuilding company at Gothenburg, Sweden. The machine weighs 340 tons and exerts a pressure of 2,000 tons to bend steel plates 1¼ in. thick and 48 ft. long. The contract is worth £100,000.

CIVIL ENGINEERING work in connection with the £18,500,000 steelworks development at the Etruria North works of Shelton Iron & Steel, Limited, Stoke-on-Trent, is to be undertaken by Tarmac Civil Engineering, Limited. The contract is worth over £2,000,000 and includes the construction of heavy foundations for a new steelworks, continuous casting plant, and rolling mill, the erection of an office block and ancillary buildings, railway marshalling yards, and road works.

ORDER WORTH over £100,000 for diesel engines and other equipment for the new oil refinery at Mersin, Turkey, has been received by Ruston & Hornsby, Limited, Lincoln, and its associate company, Davey Paxman & Company, Limited, Colchester, through the main contractor, Foster Wheeler, Limited, London. The Ruston equipment ordered includes two seven-cylinder diesel engines of 985 b.h.p. at 520 r.p.m., three seven-cylinder diesel engines of 710 b.h.p. at 600 r.p.m., and a standard diesel-hydraulic shunting locomotive powered by a Paxman 275 b.h.p. diesel.

FACT-FINDING MISSIONS composed of leading business men and industrialists drawn from the 30 members of the Export Council for Europe are to be sent to Europe to confer and work in close co-operation with the commercial representatives of the British Government, British trading interests, existing importers of British goods, and all other appropriate bodies. This step was agreed at the second meeting of the Council on Wednesday under the chairmanship of Sir William McFadzean. Nine teams of three men will leave during February to visit Britain's six partners in the European Free Trade Association (Austria, Denmark, Norway, Portugal, Sweden, Switzerland) and also France, Italy, and Spain. The remaining 10 countries covered by the Council will be visited by similar sized missions in May and June.

Obituary

MR. T. F. HUBBARD

FORMERLY one of the official representatives of the Scottish miners in the House of Commons, Mr. THOMAS FREDERICK HUBBARD died on Saturday. He was Labour MP for Kirkcaldy from 1944 until ill-health forced him to retire in September, 1959.

Born in 1898, he worked in the mines until he received a serious leg injury in 1941. He was a member of the Fifeshire Miners' Association for many years and when, in 1944, Mr. Thomas Kennedy, Chief Whip of the Labour Party, died, Mr. Hubbard succeeded him as Labour candidate for Kirkcaldy. He was a member of a Parliamentary delegation to Germany in 1946 and although he did not intervene frequently in Parliamentary debates, he could speak with authority on Scottish affairs and mining when needed.

Mr. RICHARD G. LAWSON, principal of Ogden & Lawson, non-ferrous founders, of Salterbeck, Workington, has died at the age of 61.

MR. HAROLD GODFREY JUDD, who died last weekend, was one time secretary of the National Ironfounding Employers' Federation, a position now held by his son, Mr. G. Judd.

Mr. THOMAS CROMPTON, the third generation of that name associated with Thomas Crompton & Sons, Limited, manufacturers of hinges, locks, etc., of Wigan, has died at the age of 74.

Mr. JEFFREY WILLIAM HORN, former departmental manager with Parker, Winder & Achurch, Limited, pump manufacturers, etc., of Birmingham, has died aged 78. He retired in 1948.

Mr. MICHAEL GARNETT KEELER, who represented Small & Parkes, Limited, for the sale of industrial friction materials and industrial textiles in the Sheffield area, died last week aged 69. He joined the company in 1918.

Former partner of Cope, Turner & Company, surveyors of Nottingham, Mr. LEONARD KELSALL has died at the age of 74. He left the company and worked as a mining surveyor for the National Coal Board until his retirement.

Mr. WILLIAM E. PHILLIPS, former managing director of Llanelly Associated Tinplate Companies, Limited, has died aged 75. He served in the tinplate industry all his life, holding several executive appointments. He retired about 12 years ago.

The death has occurred at the age of 64 of Mr. STANLEY FOWLER HOLROYD, a director of the Exors of James Mills, Limited, steel manufacturers, of Bredbury (Cheshire). He had been with the firm for 45 years, and formerly represented it in Glasgow.

Director of Parkinson & Cowan, Limited, Mr. CYRIL H. PEARSON has died at the age of 57. He joined the company in 1937 and became a director and general manager of the gas meter division in 1944. He joined the board of the parent company in 1957.

Former general manager of Manvers Main Collieries, Limited, Mr. ARTHUR THOMAS THOMSON has died at the age of 89. He succeeded his father as general manager and agent of the Yorkshire colliery company in 1912 and was appointed a director in 1928. He retired in 1934.

Proprietor of C. E. Rhodes & Sons, civil and mining engineers, of Rotherham, Mr. MARK RHODES has died at the age of 81. He became a partner in the firm on leaving school and with his brother, the late Col. Harry Rhodes, was consultant mining engineer for several collieries in Yorkshire and also for collieries in Europe and South Africa.

Cllr. HUBERT GIBLIN, Mayor of Scunthorpe, and a steel melter at John Lysaght's Scunthorpe Works, Limited, has died aged 60. He had been at John Lysaght's for 35 years and was the local delegate to the Iron and Steel Trades Confederation. He was a member of the National Committee which negotiated the 42-hour week in the steel industry.

Conference and consultative secretary of the No. 9 (Neath) Area of the South-Western Divisional Coal Board, Mr. JOHN HOPKINS has died at the age of 58. He had a long connection with the industry and went to Ammanford in 1924 from Swansea as secretary of the old United Colliery Company, Limited. Later, he worked in a similar capacity for the Amalgamated Anthracite Collieries, Limited, and at the No. 1 (Swansea) Area of the board. He took up his last appointment in 1951.

Mr. E. F. WATSON, a director of Efco Furnaces, Limited, Weybridge (Surrey), has died at the age of 51. He joined the company—then called Electric Resistance Furnace Company, Limited—in 1933 after serving an apprenticeship in the heavy engineering works of John M. Henderson & Company, Limited, Aberdeen. Throughout his life he was concerned with the development of electric resistance furnaces and his work embraced both furnace design and sales promotion. He was for many years sales manager and was appointed to the board in 1955.

We have learned with deep regret of the death of Mr. CHRISTOPHER JOHN COUPE. On leaving school, he was, for a short time, in the publicity department of Short Bros. & Harland, Limited, before joining the news staff of IRON AND COAL. He left us early last year for the staff of his own local newspaper, the Hitchin and District Pictorial. Just before Christmas he came in to tell us that he had secured an appointment on the Nottingham Guardian Journal, but a few days later he died from cerebral hæmorrhage. Christopher, who was 21, passed away while still in the springtime of what promised to be a highly successful career. His friends and former colleagues extend their profound sympathy to his parents and his brother.

New Export Subsidiary for Radiation Group

RADIATION, LIMITED, the domestic appliance group, has completed the co-ordination of all the group's oversea activities by the formation of a new subsidiary company, Radiation International, Limited. This company replaces Radiation Group Export Sales, Limited, as well as the export divisions of the other subsidiaries including Ascot Gas Water Heaters, Limited, and the electrical division of Radiation, Limited. Radiation chairman, Mr. W. D. King, has been appointed chairman of Radiation International, and Radiation directors Mr. A. J. Parker, Mr. F. P. S. Stammers, and Mr. S. L. Pleasance are also on the board.

The board of the new company will also include three export general managers, each of whom will be responsible for export activities over a wide area. They are Mr. G. H. Behr (the Americas and Africa), Mr. V. P. Marciandi (Europe), and Mr. P. Wilkins (Middle and Far East and Australasia). The parent board is confident that this reorganization can increase the group's exports of British designed domestic appliances.

African Notes

STEEL SITUATION EASES

But Bar on Export Orders in the Union Remains

FURTHER signs of an easing in certain sectors of the domestic steel market have been manifest in South Africa. Some allocations made by the South African Iron & Steel Corporation, Limited, have not been taken up in full, and although the allocations system remains in force, supplementary tonnages of some products have been available. The policy of preference to the domestic market has been maintained, and despite the easing in domestic demand, Iscor has not accepted orders for exports of steel products oversea.

Allocations not taken up have been particularly noticeable in the cases of galvanized and hot rolled sheets, while indications are that the demand for window sections is easing. Exports of Iscor pig-iron dropped, and only small tonnages of foundry grades, surplus to domestic requirements, have been exported.

Further development in the steel industry in South Africa is expected with the report that Dr. C. M. Kruger, general manager of Iscor, recently began licence negotiations with the Austrian Alpine-Montan Gesellschaft for Iscor to make steel by the LD process.

Pumped Coal for Power Station

For the first time in South Africa, coal will be pumped from a coal mine to a power station. The pipeline, which is to deliver 100 tons an hour of coal over a distance of 1½ miles, is to be laid soon in the Witbank area. The mine in which the pumping station for the pipeline will be constructed is Federale Mynbou's Koornfontein Colliery, while the new Komati power station of Escom will incorporate coal dewatering equipment. Escom has experimented for some time with coal pumping plant at the Wilge Power Station in the Witbank area. Engineers calculated that railing the coal would cost 10d. a ton, conveying it by conveyor belt 8d. per ton, and pumping the coal 6d. per ton.

Possibility of a new coal mine in the vicinity of Camden siding, south-east of Ermelo, to supply a future power station feeding current to the eastern Lowveld, is outlined in a report by Federale Mynbou. An intensive drilling programme over the last three years by Federale Prospekteerders, now a wholly-owned subsidiary of Federale Mynbou, has proved an aggregate of about 137,000,000 tons of good quality exploitable coal. All options over coal rights where coal has been proved are being exercized as they lapse.

First diesel-driven shuttle cars in South Africa, and a new rotary coal-breaker are among the items of equipment soon to be in operation at Blinkpan, youngest mine of the Federale Mynbou group. Close to the Komati power station, now under construction, Blinkpan is expected to deliver its first coal to the Escom station by January, 1962. Blinkpan will be one of the largest collieries in South Africa, with an ultimate annual output of 3,600,000 tons of coal, reserves having been estimated at 200,000,000 tons of bituminous coal.

Annual report of the Fuel Research Institute of South Africa says that a study of blend coking coal in the No. 5 Seam of the Witbank coalfield suggests that the *in situ* reserves and the reserves of prepared coal are about 160,000,000 tons and 101,000,000 tons respectively. Considering only areas where it is reasonably certain that the seam could yield usable blend coking coal, the *in situ* reserves are reduced to 135,000,000 tons and the yield of prepared blend coking coal to 85,000,000 tons.

Sasol, the State-sponsored South African Coal, Oil & Gas Corporation, which chiefly produces oil and by-products from coal, recently celebrated its 10th anniversary. Mr. P. E. Rousseau, managing director, said that this year the Corporation had shown its first profit. Last year a small surplus was achieved, but no allowance had been made for depreciation. The first net profit was made only five years after the first gallon of petrol had been produced from South African coal. In 1955, the turnover was £665,000, rising in subsequent years as follows: 1956-57, £2,709,000; 1957-58, £4,834,000; 1958-59, £6,722,000; and 1959-60, £8,197,000.

Output by Natal Anthracite in the year ended June 30, 1960, was 237,126 tons—an increase of 48,693 tons on the previous year. The quantity of anthracite exported showed an increase, largely because of new markets for duff in the Argentine and Israel. Mr. J. A. Hyman, chairman, states that the inland market has increased but is becoming selective, giving rise to the need for a washing plant. This is to be financed by the issue of £100,000 worth of convertible notes. The company has bought Riversdale Anthracite Colliery, which has a yearly sales quota of 25,000 tons.

The Transvaal Navigation Collieries & Estate Company, Limited, is to install a washing plant, to be financed by borrowing. It is expected to be ready for use in a year. In his review, the chairman, Mr. H. C. Drayton, states that any substantial export market for Transvaal coal is still remote.

Search for markets for Southern Rhodesian ferro-chrome, asbestos, chrome-ore, coal, and other minerals, is being made in Australia and Japan by Mr. R. Stanley, chief technical officer of the Southern Rhodesia Department of Mines, who recently flew to Australia to join the Federal Trade Mission led by Mr. A. T. R. Hutchinson.

Law Cases

Steelworks Manager Cleared of Bribery

STEELWORKS manager was cleared at Walsall Magistrates' Court of a charge of trying to bribe a rival steel firm's chief engineer to disclose details of a secret process. Mr. Kenneth Whitehall (38), a manager employed by J. B. & S. Lees, Limited, steel strip manufacturers, of West Bromwich, pleaded Not Guilty to corruptly offering the engineer £1,000 as an inducement for disclosing information concerning the affairs or business of his employers last October. A haulage contractor, Mr. Joseph Thorpe, was found Not Guilty of aiding and abetting.

Mr. D. P. Jones, for the prosecution, alleged that Mr. Thorpe asked Mr. William Hunt, chief engineer of Firth Cleveland Steel Strip, Limited, Tipton (Staffs), how much he would want to disclose a process for hardening and tempering steel strip which was carefully guarded as being a trade secret. Mr. Hunt told Mr. Whitehall he would want at least £1,000, said counsel.

Mr. Hunt said in evidence: "I did not intend to disclose the information. I intended to tell my employers what was going on." The magistrates dismissed both charges before hearing any defence evidence.

FINED FOR SLEEPING IN COLLIERY

FINE of £10 was imposed on George Richardson (19), a haulage hand, at Renishaw Magistrates' Court for endangering the safety of a mine by sleeping below ground at Westthorpe Colliery (Derbyshire). He pleaded Not Guilty. A further summons accusing him of endangering the safety of men by "lying down with his eyes closed," was dismissed.

The colliery manager, Mr. P. Griffiths, said he found Richardson curled up on a makeshift bed of boards with his eyes closed. "His cap lamp was not on, and I am satisfied that he was asleep. There could have been an influx of gas and he could have been gassed while asleep."

FOUND ASLEEP IN PIT

JOHN SIMPSON MACKIE, slabber, was fined £10 at Kirkcaldy Sheriff Court after pleading Guilty to sleeping below ground at Seafield Colliery, Kirkcaldy. The fiscal said that Mackie was found asleep in a 2-ft. space between some girders and rails about 200 yds. from the coalface. According to the overman who found him, he was in a position of some danger.

The fiscal added that on this particular occasion the accused had not been dismissed from his employment. After reading a letter submitted by Mackie, Sheriff Sinclair Shaw said that there were certain extenuating circumstances.

TWO COLLIERY DEPUTIES from Cross Keys (Mon), Mr. William Henry John Tiley and Mr. Lyndon Lewellyn, were both given an absolute discharge by Blackwood magistrates, but ordered to pay 15s. costs each, after they had pleaded Not Guilty to stealing a number of wooden blocks the property of the NCB.

DAMAGES of £4,560 were awarded to Mr. Dennis Young (29) at Durham Assizes against the National Coal Board. Mr. Young was stated to have fractured his spine when he was struck by a moving tub while walking to his work place at Esh Colliery. A 21-day stay of execution was granted for an appeal by the NCB to be considered.

DAMAGES OF £4,500—the sum sued for—were awarded by Lord Walker in the Court of Session to Brown, Bros. & Company, Limited, hydraulic engineers and brassfounders, of Edinburgh, against Lep Transport, Limited. The claim followed the loss through fire, in January, 1957, of goods belonging to Browns while in the transport company's warehouse in Glasgow.

CLAIM FOR DAMAGES against the National Coal Board by Mr. William Twist (50), a miner, who claimed to have strained his back when he slipped on a wet sleeper at Brandon Pit House Colliery was dismissed at Durham Assizes. Mr. Commissioner Roche held that the management took all reasonable steps to keep the roadway safe. There had been no negligence or breach of statutory duty by the board.

PORT TALBOT MAGISTRATES remanded four men on bail until January 17 charged jointly with stealing 246 tons of steel plate valued at £11,095 from the Abbey works of the Steel Company of Wales, Limited, between December, 1959, and October, 1960. Three others were also remanded on bail until the same date jointly chargd with stealing 5 tons of mild steel worth £230 from the Abbey Works between January and April last year.

Shipbuilding Wages Increase will Cost £5,000,000

WAGE increases for 250,000 shipyard workers were agreed at a meeting between the Shipbuilding Employers' Federation and the Confederation of Shipbuilding and Engineering Unions in London on Monday. They amount to 8s. 6d. for skilled men, 8s. for semi-skilled and 7s. 6d. for unskilled. The new rates were effective from Monday and the annual cost to the industry will be about £5,000,000.

The federation has twice previously rejected the unions' claim for higher wages on the grounds of the industry's unfavourable financial position. As a condition of the increases, it insisted that the confederation should meet it to discuss steps to be taken to secure the more economical use of manpower in the industry and to eliminate restrictive practices.

Mr. J. Rannie, president of the shipbuilding employers, said before the negotiations that in shipbuilding and ship-repairing costs must be reduced to enable the industry to get further orders. All districts of the federation were convinced that with flexibility of labour their competitive position would be vastly improved. Mr. E. J. Hill, general secretary of the boilermakers, who led the union negotiators, said after the talks however, that the proposed joint meeting could not discuss such questions as demarcation or the manning of machines. That would be infringing "the sovereign rights" of individual unions.

Liberian Iron-ore Project

WITH the completion of financing arrangements, the way is now clear for the development of the iron-ore resources of Nimba, in Liberia, by an international group, Lamco Joint Venture.

The group, on behalf of which the iron deposits are to be worked by a Swedish concern, is made up of Liberian, Swedish, and US interests. Total cost of opening the mines is about $200,000,000 and the first ore is expected to be shipped in the middle of 1963.

NEWS IN BRIEF

MRS. RICHARD WOOD, wife of the Minister of Power, won a hundredweight of coal at the Bridlington Chamber of Trade annual dinner on Monday.

NEW TRAINING CENTRE to cater specially for boys between the ages of 15 and 16 was inaugurated this week at the dry docks department, Wallsend, of Swan, Hunter & Wigham Richardson, Limited.

OVER 50,000 steel billets, weighing 12,425 tons, were unloaded recently at Newport (Mon). The cargo is the biggest single consignment of billets ever to arrive in a Bristol Channel port.

NEW LURGI gasification plant at Westfield (Fife), one of the largest in Britain, will be opened by the Queen on June 27 during her summer visit with the Duke of Edinburgh to Scotland.

PARTNERSHIP has been formed between Joseph Sankey & Sons, Limited, Bilston (Staffs), and the Oberg Manufacturing Company, of the US, for the production of carbide dies at Dudley, near Birmingham.

SHEFFIELD DEPOT of Small & Parkes, Limited, will move from its present location to a new building at 101, Scotland Street, Sheffield, 3, on January 30, 1961. The telephone number (Sheffield 25529) is unchanged.

CONSIDERATION of installing oil heating at certain schools in the borough has been deferred by Doncaster Town Council until a NCB report on the cost of coal heating has been studied by all members.

LARGEST CARGO of iron ore ever to be unloaded for the Guest Keen Iron & Steel Company, Limited, was discharged at Cardiff recently. Five 10-ton grabs unloaded the 18,000 ton-cargo at a rate of 1,000 tons an hour.

THE Wednesbury (Staffs), business of H. J. Barlow, makers of bright drawn steel, nuts, bolts, and washers, is to become a public company. A placing of 800,000 of the 2,000,000 2s. shares at 3s. 6d. is to be made by Neville Industrial Securities, Limited.

INCREASED PRICES for antimony which took effect on January 1, have been announced by Associated Lead Manufacturers, Limited. The new prices are:—99.6 per cent., £217 10s. a ton (up £10); 99 per cent., £210 (up £10); crude 70 per cent., £190 (no change).

TWO-DAY COURSE of lectures on industrial and factory law especially designed for industrial managers and executives will be given by Mr. Harry Samuels at the Industrial Welfare Society's headquarters, 48, Bryanston Square, London, W.1, on February 6 to 8.

WAGE INCREASES of about 4 per cent. were negotiated last Friday for 1,000,000 staff workers in engineering firms. The settlement, which was reached by the Engineering Employers' Federation and four unions, will cost the industry at least £25,000,000 a year.

SUBSIDIARY WORKS of Craven Bros. (Manchester), Limited, at Denton (Lancs), have been sold, together with all the plant, machinery, and equipment therein, to J. Brockhouse & Company, Limited, dropforgers, trailer makers, and ironfounders, etc., of Wolverhampton.

TECHNICAL ASSOCIATION AGREEMENT for the manufacture of electric and diesel locomotives was signed recently between North British Locomotive Company, Limited, and the Government of India. It will run for five years and follows a previous one of a similar nature.

RUSSIAN iron and steel industry has fulfilled its plan for 1960 by producing more than 5,000,000 tons of steel and 3,800,000 tons of iron over 1959's figures. Production of rolled stock increased by almost 4,000,000 tons, according to Moscow Radio.

ADVANCED technical-development unit designed to keep abreast of the expanding market for automation and instrumentation in laboratory apparatus is to be formed at Abingdon (Berks) by Quickfit & Quartz, Limited, manufacturers of interchangeable laboratory glassware.

HEADQUARTERS of the installation equipment group of the General Electric Company, Limited, have moved into a new office building at Four Ashes, Wolverhampton (Staffs). Group sales and distribution will continue at all GEC area, branch, and depot establishments.

SECOND STAGE of the new factory of Solartron Laboratory Instruments, Limited, a member of the Solartron Electric, Limited, group, at Chessington (Surrey) is now under way. It is claimed to be one of the most modern factories in the UK, with fully air-conditioned dust-free atmosphere.

WHOLLY-OWNED SUBSIDIARY of Hjo Mekaniska Verkstad Hjo, of Sweden, to be known as Hull Steel Radiators, Limited, opened a new factory at Hull on Tuesday. Manned by an all-British staff, it will manufacture pressed steel radiators for hot-water central heating installations for both domestic and industrial users.

ONE OF THE LARGEST steel and engineering works in Sheffield—that of the English Steel Corporation, Limited—was visited last week by the Lord Mayor and Lady Mayoress of the city, Ald. and Mrs. H. Slack. They were accompanied on a tour of the works by Mr. W. D. Pugh, the managing director.

THREE LOANS totalling $27,700,000 (about £9,900,000) have been approved by the US Development Loan Fund for the economic development of Yugoslavia. The money will be used to extend the Kosovo power plant, establish mills at the Sisak iron and steel works, and to buy 21 diesel locomotives for the Yugoslav National Railways. All the loans will be spent in the US.

REINFORCED PLASTICS DIVISION has been formed by the English Electric Company, Limited. Its work will be centred at the new works at Freckleton, Warton, which will involve the transfer of components manufacture for aircraft, traction, and rolling stock previously made at the Preston works. Mr. Charles Hayes, who joined the company in 1959, will be manager of the new division.

NIGHTLY SERVICE inaugurated by the North British Steel Foundry, Limited, Bathgate (Scotland) transports steel castings to customers in England within 24 hours. The company manufactures steel castings from a few pounds in weight up to 10 tons. Its associated company, Bonnington Castings, Limited, operates one of the most highly mechanized steel foundries in Britain for the production of steel castings in large numbers.

PLATE FINISHING LINE manufactured and supplied by Schloemann, AG, Düsseldorf, for the new steelworks at Rourkela, India, for Hindustan Steel, Limited, has now been put into operation. It is designed to provide continuous production and consists of a cropping and dividing shear, two hot levellers, cooling beds, an inspection bed with plate turner, a rotary shear line for plate up to ¾ in. thick, and a side shear line for plate up to 1½ in. thick. At the back of the normalizing furnace there is another hot leveller, cooling beds, and plate pilers.

New Appointments at Appleby-Frodingham

NEW YEAR appointments are announced by the Appleby-Frodingham Steel Company, Limited, branch of the United Steel Companies, Limited. Mr. F. J. Crocker, assistant engineer, will progressively take over responsibility for Appleby melting shop. He joined the United Steel Companies' graduate apprentice scheme in 1956 after graduating in mechanical engineering at Leeds University, and has been employed with the Appleby steelworks engineers since last July. Mr. J. W. Middleton becomes manager in charge of casting pits and continuous casting plant, and will be directly responsible to the melting shops manager. He joined the company in 1925 as an apprentice boilersmith.

Mr. P. M. Steward, who becomes assistant engineer, Frodingham steelworks, joined United Steel in 1953 as a graduate trainee, having graduated from Glasgow University in 1949. During his training he worked at Appleby-Frodingham and at Steel, Peech & Tozer branch which he left in 1955 to join a firm of consulting engineers. He rejoined Appleby-Frodingham last year as an assistant mechanical engineer in the development engineers' department.

Mr. M. M. Laidlaw, who started with the company in 1941 as an apprentice fitter and turner, is appointed mechanical plant engineer-designate. He will continue his duties at Appleby melting shop for the time being, and will progressively take over his new responsibilities. Mr. R. C. Walthew is appointed fuel engineer in succession to Mr. S. H. Brooks. Mr. W. Richards is made general electrical foreman, and Mr. D. W. Bell becomes lubrication engineer.

Large Expenditure Programme by Birfield Group

WITH a very large present programme of expenditure on building and machinery, the group faces a heavy task if the sum required is to be provided out of depreciation and retained profits, states Mr. H. E. Hill, chairman of Birfield, Limited, general engineering suppliers, of London, W.1. If the setback in the motor industry proves to be short-lived and earnings are maintained, it should however be possible to carry out the programme without having to raise further equity capital, he adds. Outstanding commitments at July 31, 1960, amounted to £3,400,000.

Mr. Hill says that proposals have been made to the company which could lead to a very large increase of exports to Europe and elsewhere. To undertake the business would entail a large expansion of the company's forging and machining capacity, but an application to the Board of Trade to erect such capacity where existing management could control the plant and suitable labour could be available had been refused.

Demand for virtually all the group's products in 1959-60 was greater than its capacity to supply. Group trading surplus increased from £900,804 to £2,431,397. A one-for-five scrip issue has been proposed.

IN ADDITION to holding stocks of FBC ball and parallel roller bearings, all branches of J. H. Fenner & Company, Limited, power transmission engineers, of Hull, now stock "Truarc" retaining rings.

Welding Pioneer Retires from Murex

AFTER 38 years' service with the company, Mr. H. Martin, home sales manager of Murex Welding Processes, Limited, Waltham Cross (Herts), retired last December on reaching retiring age. Mr. R. E. H. Bell, assistant home sales manager for the past 10 years, succeeds him. Mr. K. Leevers and Mr. P. Hobbs have been appointed assistant home sales managers (technical), and Mr. S. E. Smith has been appointed plant sales manager.

Mr. Martin is one of the pioneers of the welding industry. His interest in welding began in 1917 at the old Great Eastern Railway Works where he was apprenticed. He joined the Premier Electric Welding Company, Limited, in charge of the works in 1922. This company was later taken over by the Murex organization and he served as a technical representative and research engineer. In 1939 he was seconded to Imperial Chemical Industries, Limited, for a two-year period, when he assisted the research department at Billingham in the development of techniques for the welding of non-ferrous metals and organized training schemes for welders.

Mr. Martin is a founder member of the Leeds and District Branch of the Institute of Welding. He has served on many British Standards Institute committees and is at present a member of the council of the Institute of Welding and of the Institute's membership committee.

Wild-Barfield Shaker Hearth Furnace Installation

ORDER for a continuous shaker hearth furnace installation has been placed with Wild-Barfield Electric Furnaces, Limited, of Watford (Herts), by L. H. Newton & Company, Limited, nut and bolt makers, etc., of Birmingham. The equipment will be charged automatically and work will be untouched by operators as it passes through hardening, quenching, washing, tempering, and final quenching for delivery at the rate of 600 lb./hr.

Initial charging will be by means of a vibratory feeder, and progress through the hardening and tempering furnaces will be by twin shaker hearth trays. Belt type extractors will be used to remove work from the quench tanks.

Short-time Working at Carriage Works

REDUNDANCY and short-time working are imminent in certain sections of the Birmingham factories of the Metropolitan-Cammell Carriage & Wagon Company, Limited. About 20 workers will be dismissed, and initially about 100 will be affected by short-time working.

Lack of railway orders has also forced George Turton, Platts & Company, Limited, Sheffield, to declare 100 workers redundant. Some men in the railway buffer department have been transferred to other departments, but even when transfers are accounted for 80 men will still be out of work.

ABOUT 90 GUESTS attended the annual luncheon for retired long-service employees of David Brown Industries, Limited, last Friday.

Company Statement

JOHN SUMMERS & SONS, LIMITED

Larger Output Despite Difficulties

MANY PRODUCTION RECORDS BROKEN

"Reasonable" Increase in Dividend

MR. RICHARD F. SUMMERS REVIEWS OPERATIONS

THE annual general meeting of John Summers & Sons, Limited, will be held on February 2, at the Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W.1.

The following is the statement of the chairman, MR. RICHARD F. SUMMERS, which has been circulated with the report and accounts:—

The year 1959/60 not unexpectedly produced its problems and difficulties. We were endeavouring on the one hand to maintain production and on the other to carry out very far reaching alterations and modifications to certain sections of our plant, some of these alterations being of a highly complicated nature. We are naturally disappointed that these changes have taken longer than had been expected, but in spite of the difficulties there was in fact an increase in the make of pig-iron and steel ingots and a modest increase in deliveries of sheets.

Balance Sheet and Dividend

In setting out our accounts we have always striven after clarity and simplicity and from comments which have been received from a variety of sources it would appear that we have achieved a measure of success in this direction. Once again the Directors' Report is fairly full and detailed and therefore I think there are very few items in the Balance Sheet to which I need refer. In assessing the results I would remind you that in my statement last year I indicated that we did not expect to be able to report any large increases in production or profits in 1960. Taking everything into consideration I feel that our results are not unsatisfactory, and I hope you will agree that the increase of 2½ per cent. in the effective rate of dividend to a total of 15 per cent. for the year is reasonable in all the circumstances. This year on the last two pages of the accounts certain statistics have been included which I think demonstrate in a convenient form the very considerable growth of the Company in the last thirteen years.

You will also see that our capital expenditure for the year amounted to £8,322,000 and that £7,253,000 was retained by way of Depreciation and Reserves. It is perhaps also interesting to note that during the thirteen years the total expenditure on fixed assets and the increase in working capital employed in the business have together amounted to some £74,000,000 and that of this amount we have provided no less than £54,000,000 from the Company's own resources. These figures will serve to emphasise the strong competitive position the Company enjoys today which I feel sure will stand us in good stead in meeting whatever eventualities may lie ahead.

Development and Production

As the result of a lot of hard work by all concerned, substantial progress was made during the year and we are hopeful that within a matter of a few months practically all the major alterations at Shotton will be complete.

In recent months production records have been broken in practically every Department of the Works. The alterations to the hot strip mill which were completed shortly after the end of the last financial year have turned out very satisfactorily and have greatly increased its capacity. The performances of the cold reduction mills in the last few weeks have demonstrated the higher tonnages that may be expected from these units, and with the addition of the new high speed cold reversing mill at present being installed we shall have sufficient capacity to roll and finish the whole of our planned output of ingots.

Although it was not possible to fulfil all the requirements of our customers we have been able to retain our friendly relations with them, and I think can claim that our quality and service have been well maintained. We have also kept up our contacts with our overseas customers, but owing to the very heavy demand at home here again it has not been possible to satisfy their full requirements. While there has been no official control on the export of sheets, at Government request the British sheet makers have agreed to a voluntary restriction so long as the shortage in the home market exists.

Future Demand

I have always maintained that in the long run, as people throughout the world become more prosperous, one could expect to see the demand for flat rolled products steadily increasing. I am not unmindful of

the fact that there are competitive materials, but a steel sheet has many advantages and there is no reason to suppose that its uses in the future will be limited to those which exist to-day. The application of various coatings to it, notably zinc and plastic, increase its durability and its versatility. The advantages of galvanised or electrolytic zinc coated sheets are being more and more appreciated and their uses extended all the time. Our coated sheets enjoy a high reputation and the demand for them continues to grow to such an extent that we are increasing our capacity both for galvanising and electrolytic coating. The uses for Stelvetite, which is our plastic coated sheet, continue to develop and we have production facilities that will take care of what we hope will be an increasing demand. The coating of sheets is not limited to zinc and plastic and our research people are keeping a close watch on developments both as regards demand and manufacturing techniques.

At the time of writing three months of the current financial year have passed and it is satisfactory to be able to report that by comparison with the similar period last year production has increased, with an improvement in the financial results. Thanks to the strength in the capital goods market and demands from a number of other industries on paper our order book is full, but it is common knowledge that recently there has been a distinct slackening in demand from the motor industry and the manufacturers of durable consumer goods. Part of this may well be seasonal and part due to a falling off in export markets. The position is also adversely affected by the fact that a number of our customers, unable to get all their requirements from home suppliers, placed substantial contracts abroad, but with the recent falling off in consumption a large quantity of these imported sheets is still in stock in their plants. There is a prevalent view that there will be an improvement in the position in the spring. If this does turn out to be the case we should be able to dispose of the output from our increasing capacity with, I would expect, a beneficial effect on profits. In any event I should be very disappointed if we could not dispose of more than we produced last year.

Subsidiary Companies

Shelton Iron and Steel Limited

Throughout the year the Shelton Iron and Steel Company at Stoke-on-Trent had a full order book and the management are to be congratulated on the record results that they achieved.

So far the bulk of our capital expenditure has been concentrated on the main Works at Shotton, for it is here that flat rolled products are produced, the demand for which has been increasing ever since the end of the war. Whilst certain modifications and additions have been made at Shelton and the plant has been well maintained, much of it is very old. In recent years there have been considerable developments in the rolling of sections both in this country and overseas. With the introduction of the new light sections and the increasing use of universal beams and columns we are convinced that if the Shelton Company is to maintain its competitive position in the trade it is essential that it should be equipped to meet these new and growing demands. It has therefore been decided to install modern medium size section and universal mills. From investigations that we have made we are satisfied that they will produce economically and provide the maximum amount of flexibility. At the same time we are also going to take advantage of recent developments and install pneumatic steelmaking and continuous casting in place of the old open hearth furnaces and cogging mill. These new methods have very great significance as they have completely altered the economics of the process and have made it possible to produce steel in comparatively small quantities at a cost that can compete with a modern large output plant.

Whilst the scheme is mainly a replacement of existing plant it is the intention in the first instance that there should be a modest increase in output from the Shelton Works, and in planning the new lay-out provision will be made for increasing production further should circumstances warrant it at some future date. Fortunately there is sufficient room to enable these new Works to be built alongside the existing ones so that there will be no interruption to production during the erection period.

As stated in the Directors' Report, we estimate that this first stage will involve an expenditure of some £18,500,000. We have gone very carefully into the economics of the scheme and believe that it will show a satisfactory return on the capital required. The new Works when completed will be employing many of the most modern techniques known today and should be capable of efficient and economic production. Shelton will then be in a highly competitive position for, geographically, they are extremely well situated to supply the Midland demand for sections, and the new mills will enable them to give to their customers, who are many and varied, a wide range of products including the new light section which we feel quite sure they will insist upon having in the foreseeable future.

Castle Fire Brick Company, Limited

Our Brick Company has had an extremely busy year and has had no difficulty in disposing of the whole of its output of building bricks and refractories. As a result profits show a satisfactory increase. During the year it was decided to embark upon a number of improvements and alterations in the various Works and these schemes are now well in hand.

Burnell & Company, Limited

The heavy demand for sheets which existed all through the year enabled Burnell & Company and their associates to operate their hand mills on a much more satisfactory basis than in the previous year and to show improved results.

Board of Directors

As stated in the Directors' Report, Mr. J. Ivan Spens, O.B.E., C.A., has tendered his resignation from the Board. He became a Director in 1939 and his wide knowledge of financial matters has proved of the greatest help and benefit to the Company. I should like to express my own personal thanks and appreciation to Mr. Spens for his services as a Director and for the many kindnesses which he has extended to me and my colleagues over the last twenty-one difficult years.

At a meeting held in December the Board appointed Mr. Stephen A. R. Gray and Mr. Peter J. Summers as Directors of the Company. Both these young men, who are in the early thirties, have had considerable experience in the industry. Whilst those of us who have been responsible for the conduct of the Company for the last twenty-five years or so have still, I hope, some few years of useful service ahead of us, we felt that the time had come when a start should be made to lay the foundations for the future administration, and that it would be helpful if the younger generation had a number of years' experience

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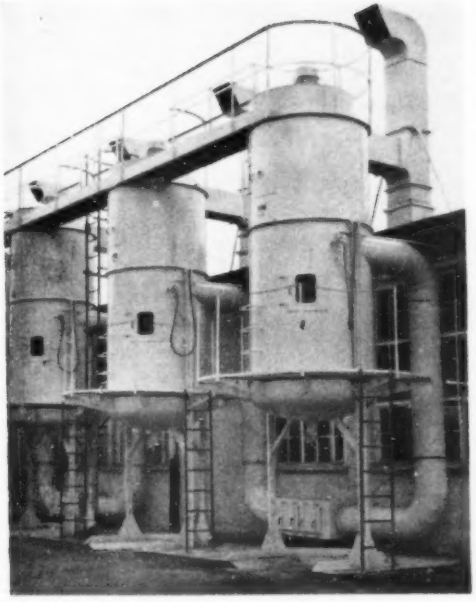

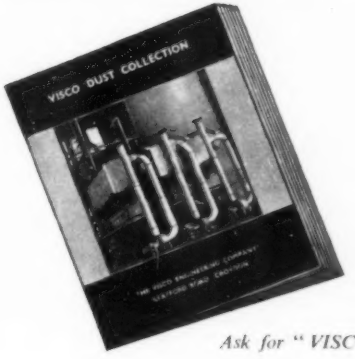

If you have a dust recovery or powder handling problem of any kind, you will find our latest brochure useful and interesting. In it we discuss dust collection in general and give numerous examples of the application of dust recovery equipment to various industries. The information in the brochure is based on many years' experience in dealing with practically every kind of material in powder or fibrous form. It also contains illustrations showing different types of equipment varying from large centralized plant to small units for use with individual grinding or polishing machines. Enquiries invited to THE VISCO ENGINEERING CO. LTD., Stafford Road, CROYDON. Croydon 4181.

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Ask for "VISCO Dust Collection", free on request.

under our guidance so that we may ensure the continuity of our traditions and our policy.

Tribute to Employees

In conclusion, I feel justified in saying that whilst we did not achieve all our objectives during the year which has closed we did make considerable progress and brought ourselves nearer to our immediate goal. Naturally this was not achieved without effort and I should once more like to pay tribute to all the employees of the Company for the contribution which they made. I want, especially on this occasion, to express our thanks and appreciation to the Engineers and Departmental Managers who have displayed great ingenuity and patience in the complicated changeover operations with which they have had to contend. Whatever the future may hold we shall continue to strive for greater efficiency and economy, and will continually watch for new developments and techniques and not hesitate to apply them when they would appear to be to our advantage.

Geological Society Awards

COUNCIL of the Geological Society of London has made the following awards for 1961:—Wollaston Medal to Prof. Roman Kozlowski, Emeritus Professor of Palæontology, University of Warsaw, in recognition of his distinguished contributions to palæozoology, especially to knowledge of the graptolites.

Murchison Medal to Mr. W. N. Edwards, Assistant Director of the Geological Survey (Leeds), for his contributions to the stratigraphy and structure of the coal measures, particularly in the Yorkshire-Nottinghamshire coalfield. Lyell Medal to Dr. J. V. Harrison, lately Reader in Structural Geology, Oxford University, for his contributions to structural geology and his pioneer work in remote countries.

Bigsby Medal to Prof. Alwyn Williams, Professor of Geology, Queen's University, Belfast, in recognition of his researches in Lower Palæozoic stratigraphy, palæontology, and structural geology. Wollaston Fund to Dr. E. A. Vincent, Reader in Mineralogy, Oxford University, for his researches on the iron-titanium minerals and on geochemistry. Murchison Fund to Dr. J. Ineson, District Geologist (Water Department), Geological Survey and Museum, London, for his fundamental contributions to the investigation of groundwater resources in Britain.

A moiety of the Lyell Fund to Dr. R. G. West, Demonstrator, Botany Department, Cambridge University, for his contributions to the geology and palæobotany of the Pleistocene of the British Isles. Another moiety of the Lyell Fund to Dr. W. T. Dean, Palæontology Department, British Museum (Natural History), for his work on the stratigraphy and palæontology of the Middle and Upper Ordovician in Great Britain.

Another Shaft-sinking Record for South Africa

WORLD shaft-sinking record was recently established by Haartebeestfontein Gold Mining Company, Limited, in the No. 4 shaft in the Klerksdorp area, when 1,106 ft. were sunk and lined in a month.

When the shaft had reached 160 ft. the precementation crew of the African subsidiary of the Cementation, Limited, group, took over and treated the underlying dolomite to a depth of 1,600 ft.

The Scrap Markets

Need for Imports Continues

WHILE the home scrap trade continues to be fully occupied meeting the demands of steelmakers, foundries, and blast furnaces, it looks as though the increasing scrap imports which were necessary last year will continue. The accent is on maintaining a flow of processed and well-prepared steelmaking scrap of the better qualities, and there will be no easement in this direction so far as can be seen.

Cleveland—There is some difficulty in providing the steel foundries with all the short heavy scrap they need and available supplies are quickly absorbed. The improved market for cast-iron scrap, needed by foundries locally as well as in the South Yorkshire and Lincolnshire areas, is still evident and baled scrap for the blast furnaces also represents another aspect of the activities at most yards.

Local supplies available are also being eked out by coastwise shipments and road transport of scrap arisings in the southern part of the country.

Scotland—The market in Glasgow and the West of Scotland is now beginning to pick up again after the New Year holiday. Most producers and merchants have resumed operations, but as yet delivery is not fully into its stride, and it will take some time to return to normal working.

Works in general have resumed their intake of scrap, and with full order-books for a considerable time ahead, they are again pressing suppliers for deliveries of suitable melting scrap.

South Wales—Demand is not as heavy as it has been for many months past. Merchants are still receiving inquiries for the heavy and better grade scrap, but there is no demand for the lighter grade material.

Supplies are sufficient to meet the needs of steelmakers and ironfounders, but there are no large stocks of heavy grade material on hand either in merchants' yards or at steelworks. The call from makers of domestic appliances is still heavy and constant.

Record Profits in Yorkshire Copper Works' 50th Year

RECORD profits were made in the year ended July 31, 1960, the company's fiftieth anniversary, by Yorkshire Copper Works (Holdings), Limited, holders of a 50 per cent. interest in Yorkshire Imperial Metals, Limited, makers of non-ferrous tubes and fittings, etc., of Stourton, Leeds. Mr. G. P. Norton, chairman and managing director, in his annual statement to shareholders, recalling that at the time of the formation of YIM in 1958 the company had voluntarily accepted a drop of one fifth in profits, states that within two and a half years the position has been restored and there has even been an improvement on the boom year of 1956.

Since the year-end the company's tube making capacity has remained fully occupied, and the order-book shows no sign of any falling off in general demand. "Perhaps we can sum up our outlook as one of guarded optimism," says Mr. Norton.

SOME 70 EMPLOYEES of General Refractories, Limited, Sheffield, who four months ago set up an investment club under the direction of Mr. J. L. Hilton, financial and administrative executive are considering buying shares in the company. So far they have invested in cement, shirt manufacturing, steel, and building.

A single strainer of the type we supply to the C.E.G.B. handles five million gallons of water an hour—enough to maintain quite a spectacular waterfall. At Aberthaw Power Station there are six such units with a total capacity of 30,000,000 g.p.h. straining the condenser cooling water.

Richardsons Westgarth rotary strainers are made in a range of sizes from 160,000 g.p.h. to 5,000,000 g.p.h., they are self cleaning, operate continuously, and the accumulated sludge is blown out at intervals without interrupting the flow.

Please write for illustrated brochure.

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CLASSIFIED ADVERTISEMENTS

PREPAID RATES: **Fifteen words for 7/6 (minimum charge) and 4d. per word thereafter. Box Number 2/6 extra per insertion (including postage of replies). Situations wanted 2d. per word throughout.**

Advertisements accompanied by a remittance and replies to Box Numbers should be addressed to the Advertisement Manager, Iron and Coal Trades Review, John Adam House, 17/19, John Adam Street, London, W.C.2. If received by first post Tuesday, they can normally be accommodated in the next Friday's issue.

SITUATIONS VACANT

MINISTRY OF POWER: MINES INSPECTORATE. Permanent posts for men at least 27 on 1.4.61 with First Class Certificate of Competency under Mines and Quarries Act, 1954, and at least two years, normally within the previous five years, as manager or under-manager of a mine (preferably coal mine) under that Act. Practical knowledge of metalliferous mining and quarrying an advantage. National salary scale £2,280—£2,650. Starting pay may be above minimum. Write CIVIL SERVICE COMMISSION, 17 North Audley Street, London, W.1, for application form quoting S/4975.

ASSISTANT TO THE RAILWAY ENGINEER required by large Steel Works, to prepare and implement schemes for new track layouts, diesel locomotive repair shops, etc. Permanent position for men age 24/35 with opportunity to gain practical experience including routine maintenance. Must be able to prepare accurate railway layout drawings. A salary commensurate with the age and qualifications of the applicant will be paid, also assistance with removal expenses and temporary lodging allowance. Pension scheme and staff canteen facilities available. Apply to PERSONNEL MANAGER, ROUND OAK STEEL WORKS, Brierley Hill, Staffs.

PROGRESSIVE Company with expanding interests in the mining equipment field has vacancy for SALES ENGINEER in the SCOTTISH COALFIELD.

Preference will be given to candidates with previous sales and underground management experience.

This is a permanent progressive appointment, with car and expenses provided. A superannuation scheme is in operation.

Reply, giving full details of previous experience, to SALES DIRECTOR, Box PC374, IRON AND COAL TRADES REVIEW.

DAVY AND UNITED ENGINEERING COMPANY LIMITED

APPLICATIONS are invited for the position of METALLURGIST/CHEMICAL ENGINEER with the Steel Processes Division in our Suffolk House premises which are centrally situated in Sheffield. Work is on design problems in the rapidly expanding field of oxygen steelmaking. A knowledge of Metallurgical Processes is required.

The successful applicant should be of Graduate or equivalent status and previous experience in the steel industry is desirable, but not essential.

Salary commensurate with age, qualifications and experience.

Apply in writing in first instance with details of age, experience and qualifications, to:—

Personnel Department,
Davy and United Engineering Company Limited,
Darnall Works,
Sheffield, 9

SITUATIONS VACANT—*contd.*

DIVISIONAL MECHANICAL ENGINEER required by National Coal Board, Northern (N & C) Division, Whitley Road, Longbenton, Newcastle upon Tyne, 12. Applicants should have had extensive practical experience of colliery mechanical plant and equipment and must be fully conversant with the design, installation, operation and maintenance of surface and underground mechanical plant and machinery. They should have held previous posts requiring enineering administrative responsibility. Corporate membership of an appropriate professional body, or an equivalent technical qualification, is desirable. Salary within range £2,200—£3,000 p.a.

Applications giving date of birth and full details of education, qualifications and experience to STAFF DIRECTOR at the above address by 24th January, 1961. Please quote: M/2.

NORTH STAFFORDSHIRE COLLEGE OF TECHNOLOGY STOKE-ON-TRENT

Principal: E. R. PATRICK, Ph.D., B.Eng., A.M.I.Mech.E., A.M.I.E.E.

MINING DEPARTMENT.

APPLICATIONS are invited for the post of ASSISTANT LECTURER, Grade "A," to teach general and mining subjects, mainly in the earlier years of mining courses and in courses for training mining entrants. Applicants should hold a colliery manager's certificate. Teaching experience would be an advantage.

Salary scale: Assistant, Grade "A"—£520 × £27 10s. (16) × £40 to £1,000. The commencing salary will depend upon the qualifications and experience of the applicant.

Further particulars and forms of application may be obtained from the Principal.

H. DIBDEN,
Clerk to the Governors.

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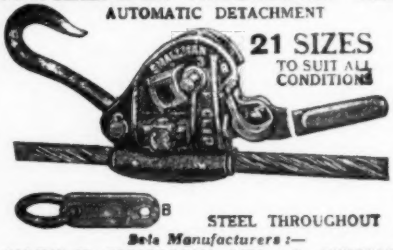

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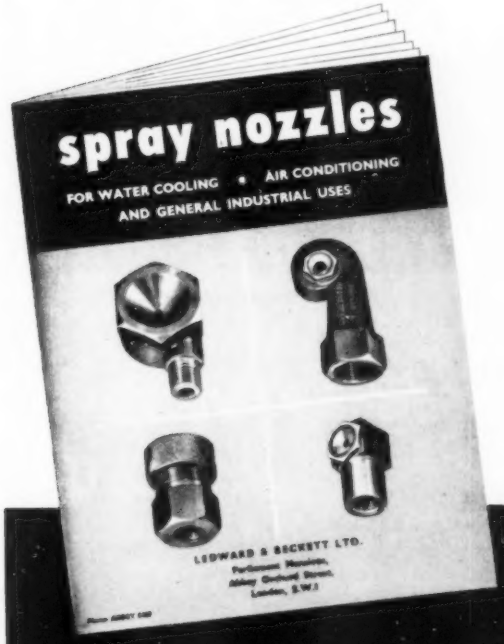

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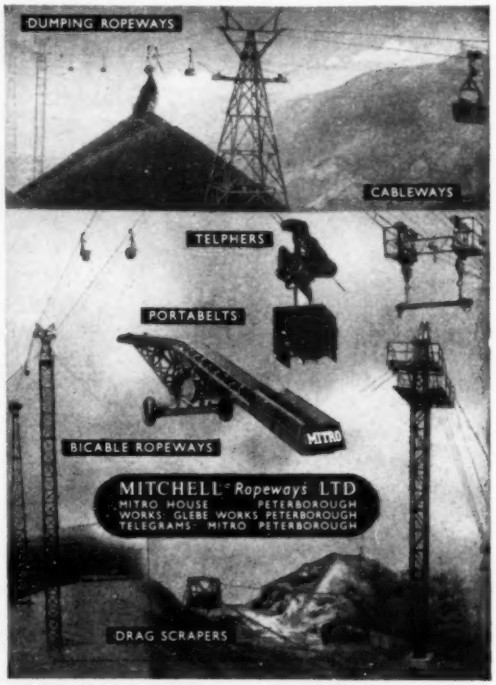

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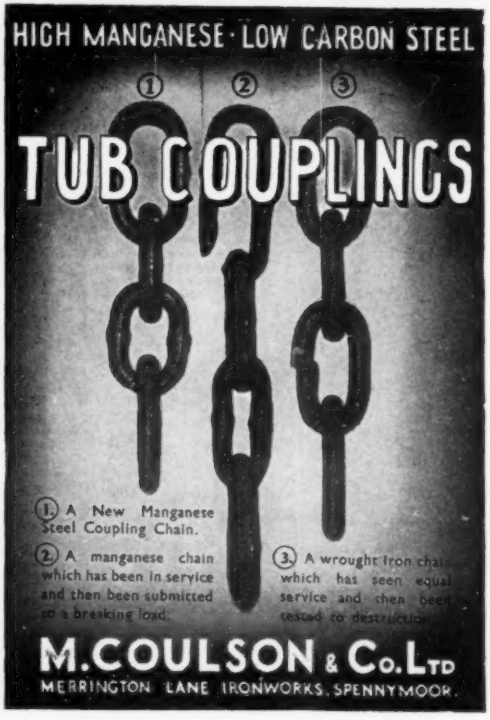
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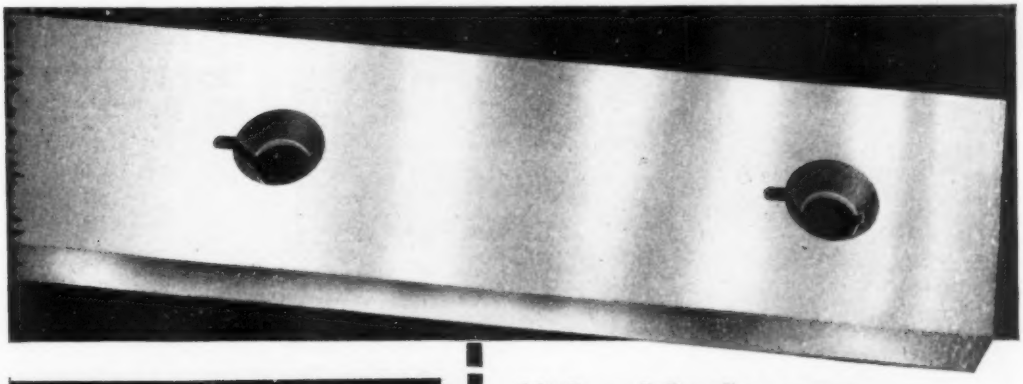

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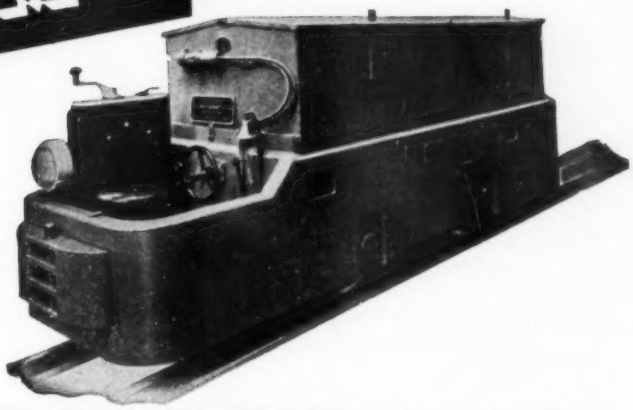

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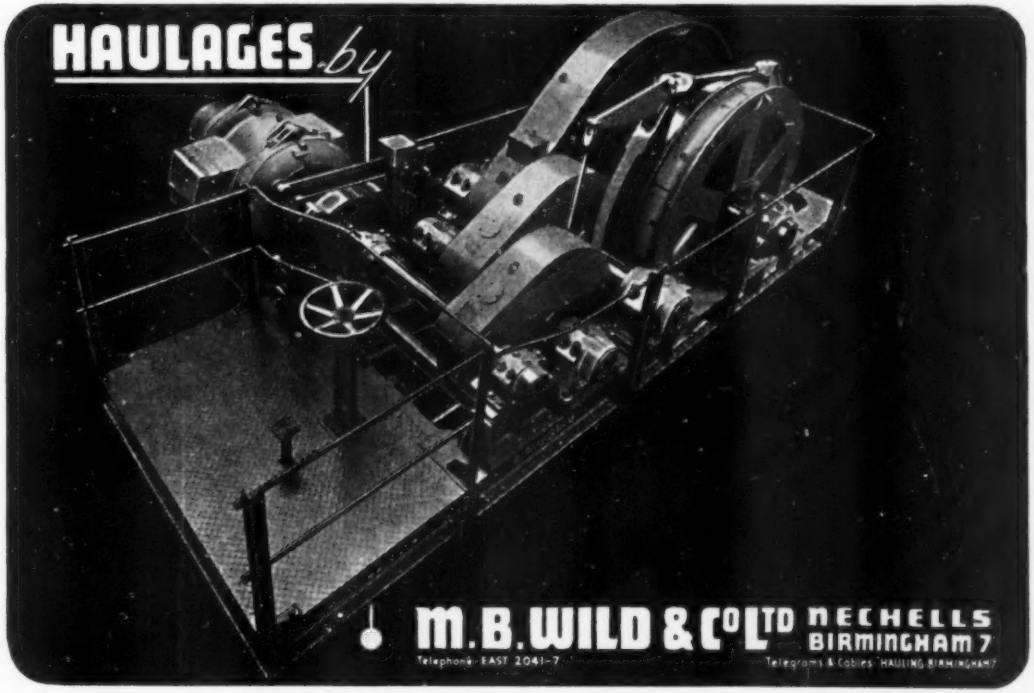

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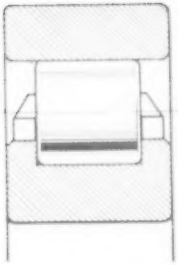

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